# The Diffusion of the Internet amongst South African Primary Care Doctors: An Activity Systems View

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# Work appearing in other publications

As this work has occurred over several years, portions of this thesis have already been published. These articles are:

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*The relevant contributions to these publications were made solely by the author.

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# Abbreviations

AMA - American Medical Association
AOA - American Osteopathic Association
ARPANET - Advanced Research Project Agency Network
ASM – Activity Systems Model
BPR - Business Process Reengineering
DoI – Diffusion of Innovations
CGP – Clinic General Practitioner, or a General Practitioner working in a public clinic
CME – Continuing Medical Education
CPD – Continuing Professional Development
EMR – Electronic Medical Record
E-RX – e-Prescribing, Electronic Prescribing
GP – General Practitioner
GSM – Global System for Mobile Communications
HGP – Hospital General Practitioner, or a general practitioner working in a hospital
HINARI - Health InterNetwork Access to Research Initiative (a WHO project)
HPCSA – Health Professions Council of South Africa
ICD10 - International Classification of Diseases and Related Health Problems 10
IP - Information Prescription
IP – Internet Protocol (See also VoIP)
ITU – International Telecommunications Union
MeSH – The US National Library of Medicine's Medical Subject Headings
MCQ – Multiple Choice Question
PBL – Problem Based Learning
PGP – Private General Practitioner, or a General Practitioner in Private Practice
SA – South Africa
TAM – Technology Acceptance Model or Technology Adoption Model
TRA - Theory of Reasoned Action
UTAUT - Unified Theory of Acceptance and Use of Technology
VoIP – Voice over Internet Protocol (or Voice over IP)
VRE – Virtual Research Environment
WWW – World Wide Web

# Abstract

*Introduction and Background*: From Everett Rogers' theory of Diffusion of Innovations (DoI) and Yrjö Engeström's Activity Systems Model (ASM), this thesis attempts to create models of South African Primary Care doctors' Internet usage, with a view to improving the delivery of Primary Care in South Africa.

It identifies the problems associated with the South African Primary Care doctors' access to information, communication with colleagues, communication with patients, the patient as partner, and practice management. It raises a practical research question of how the Internet can best be used to serve the needs of South African Primary Care doctors in dealing with these problems.

*Theoretical Background*: It then examines the two theoretical perspectives that guide the research, the Activity Systems Model and Diffusion of Innovations, and raises two research questions regarding the relationship of these theories to the South African Primary Care doctors' use of the Internet.

*Methods*: The thesis then proposes a three part study: an international systematic literature review of Internet use by doctors, a survey of South African Primary Care doctors, and a series of interviews and focus groups using Grounded Theory to provide explanations for the survey results.

The systematic literature review obtains descriptive data on usage, barriers and motivations. Based on these figures and the theories, the thesis makes predictions about usage by South African doctors. The survey of 2 600 South African Primary Care doctors and follow-up interviews and focus groups with 19 doctors provide data against which the predictions are measured, and the models of the South African usage patterns developed.

*Results:* South African Primary Care doctors use the Internet in ways that are similar to their International colleagues, but variations in the patterns exist. While differences are caused by infrastructural shortcomings, organisational and social issues have a critical effect.

*Discussion*: DoI and ASM theories are used to model usage patterns. The research questions are answered through interweaving DoI and ASM. Both DoI and ASM are appropriately modified, and provide an analytical framework for understanding Internet usage among doctors. The final model produced is a DoI-ASM framework that describes the transition of the doctors' practice in Primary Care within the context of the Internet diffusion, and the impact of the changing nature of the patient as partner. The value of the model lies in its predictive potential for future Internet usage patterns of the South African Primary Care doctors

*Conclusion*: While DoI and ASM are used to explain the South African Primary Care doctors' use of the Internet, deeper insights are derived by modifying and combining them for comprehensive descriptions and predictions.

The contribution of this thesis is an Activity Systems Diffusion Theory based on the 'marriage' of Diffusion of Innovations with the Activity Systems Model. The significance of the thesis is that it:

- provides corresponding descriptive usage data for completion of a global picture of doctors' use of the Internet;
- explains the reasons, processes and mechanisms for the various usage patterns, including non-use, in South Africa, and identifies the chief factors that impact on these usage patterns;
- develops a unique theoretical construct, grounded in the data, that clearly explains the interplay amongst the factors, and
- provides a practical application of the knowledge gained to allow the use of the Internet by South African Primary Care doctors to solve many of the problems associated with effective delivery of Primary Care in South Africa.

# Chapter 1: Introduction

## 1.1 Introduction

Medical informatics is concerned with the acquisition, processing and use of patient information in the delivery of healthcare [1-3]. Although computers form a crucial part of medical informatics, the focus is not on the technology, as "medical informatics is …as much about computers as cardiology is about stethoscopes" [1]. The tools themselves are a means to an end – the delivery of quality healthcare.

Crucial, therefore, is the fact that the value of any new medical informatics' technology must be appraised in relation to its impact on the delivery of healthcare. In the past, the introduction of new medical technology was often characterised by both excitement and fear. As early as the first stethoscope and thermometer, introduced into an already complex interaction between patient and doctor, technology has brought with it the fear that the "machines have created a cold and impersonal chasm between the healer and the patient" [4]. Although the potential value of the technology is usually recognised, there is frequently uncertainty regarding the extent to which the technology can easily be introduced and be compatible with current operations. The fear of technology failure has also been the concern of both patients and doctors [4; 5].

## 1.2 The Internet

In the late 20th century, the use of the Internet opened new possibilities for medical practice [6]. In the 1980s, the areas of medical management and information research [5; 7] were prominent in the discussions surrounding the use of the Internet in health care. By 2005, while these aspects remained crucial, there was increasing awareness of the value of electronic communication with colleagues and patients [8], and the role of the Internet was being assessed in this light also.



While any understanding of impact will need to investigate the use of the technology at the point of contact between doctor and patient, there is a second aspect that needs to be addressed, and this aspect results from the nature of the Internet. Unlike the stethoscope, the Internet was not originally conceived as a tool of health care, and its development is driven by many variables in an environment not unique to health care. It is a tool that is used outside the medical practice environment, by people who do not practice medicine. This implies that, when understanding the role of the Internet to health care delivery, one must be cognisant of the technological and social environment in which the health care is being delivered, as well as the spread of the Internet throughout that environment.

## 1.3 The need

Although assessing the current role of the Internet in medical practice is a valuable exercise, it is only a start. More important is the need to understand the forces at work, within both the workplace environment and the broader context, and how these forces affect the delivery of health care. This understanding will allow planners to prepare effectively for a range of possibilities that will unfold in the ever-changing technological and medical environment.

## 1.4 Theories

There are models that assist in understanding the impact of introducing new tools into the workplace. One such is Yrjö Engeström's Activity Systems Model (ASM) [9]. Although this will be examined in more detail later, the model describes workplace interactions, and has been used frequently in the description of medical interactions [9-14]. The extent to which ASM adequately describes activities in the information age is unclear, especially in contexts of variable service delivery.

Similarly, Everett Rogers' theory of Diffusion of Innovations (DoI) [15] describes the diffusion of an innovation across a population, and therefore gives insight into the technological context in which a study of a new innovation may be placed. The importance is not only for a description of the current environment, but, if the diffusion has been accurately predicted, then there is the strong possibility that it can be used to predict future Internet innovations.

Given the scope of Engeström's and Rogers' work, it is possible to propose that these approaches, if modified and combined, can provide the required framework for predicting future Internet usage based on present usage patterns.

## 1.5 The context

While international Internet usage data will have a direct bearing on this study, this study focuses specifically on the South African context. In particular, South African Primary Care doctors in varying contexts of the South African environment.

To address the said contextual challenge, this study has a two-pronged approach. Firstly, it attempts to determine the applicability of ASM and DoI to understanding the South African Primary Care doctors' use of the Internet, and assesses the contribution to these theories to this end. Secondly, on a more practical level, it applies the lessons learnt from the theory directly to the context, to determine the extent to which Primary Care in South Africa can be improved. This application will allow for a better grasp of the future possibilities, and for the more effective utilisation of Internet technologies, both current and possibly those that do not yet exist. In turn, given the importance of the Internet in medical informatics, this application may impact directly on the delivery of Primary Care in South Africa.



## 1.6 The research questions

To address these issues, the research questions to be answered are:

1 To what extent does Engeström's Activity Systems Model accommodate Internet usage by South African Primary Care doctors?

2 To what extent does Everett Rogers' Theory of Diffusion of Innovations predict and explain the Internet usage patterns by South African Primary Care doctors?

3 What can be done to ensure that the Internet is used to best serve the needs of South African Primary Care doctors?

A more detailed description of the development of these research questions is given in Chapters 2 and 3.

## 1.7 Overview

This thesis is organised along the following lines:

Chapter 2 will give a background to the nature of Primary Care, and will identify five specific needs of Primary Care. These needs will be described in both their global and South African contexts, and they will form study areas of this thesis. A brief description of the Internet will then lead into the question concerning the extent to which the Internet might meet the needs outlined, and the development of the practical research question on how the Internet might best be used to serve the needs of the South African Primary Care doctor.

Chapter 3 will detail the theoretical background. It will describe Engeström's Activity Systems Model (ASM), with particular reference to its application in medical practice, and will briefly situate the model in relation to this study and the Primary Care needs identified in Chapter 2. Then it will describe Rogers' theory of Diffusion of Innovations (DoI), the elements and processes, and will also deal with the criticisms and shortcomings of the theory. This is necessary because the theory impacts upon the methodology, and, rather than ignoring any shortcomings, the thesis must take care to minimise the impact of these.

From the discussion, two theoretical questions (Research Question 1 and 2) will be raised, each concerning the relationship between the relevant theory and the South African Primary Care doctors' use of the Internet. Answering these two questions will be crucial to answering the practical question raised in Chapter 2.

Chapter 4 will detail the overall methodology of this three-part study, which involves:

1. A systematic literature review of international surveys of doctors' use of the Internet
2. A structured survey of South African General Practitioners and their use of the Internet
3. A qualitative study, using interviews and focus groups, of South African General Practitioners.

Leading in from the preceding chapter, this chapter will discuss different methodological applications of DoI, and will introduce the methodological process of Glaser and Strauss' Grounded Theory, the methodology used to gather the qualitative data in this study.

Chapter 5 will present the results of the systematic literature review of surveys. After a brief discussion, these results will be synthesised into predictions of usage in South Africa, setting the specific issues to be addressed in answering Research Question 2.

Chapter 6 will begin the presentation of the results of the survey and focus groups of South African doctors. This chapter will present the overall demographics of the participants, and the usage results. It will concentrate on Internet users, and the relationship of their usage in the context of the five study areas outlined in Chapter 2.

Chapter 7 will continue the presentation of results, and will focus on the non-users and other issues that were raised in the data.

Chapter 8 will present an overall discussion of the results. This chapter will present a detailed analysis of the results, and will discuss the results in the light of ASM and DoI. Research Questions 1 and 2 will form the framework of this chapter, and will be answered in this chapter. In the process, models will be developed to explain various findings. The chapter will end by offering a model that accounts for activities performed in the use of the Internet in Primary Care.

Chapter 9 will answer Research Question 3, supplying information regarding the practical implementation of solutions based on the lessons learnt during the course of the study, and the models created in the preceding chapter.

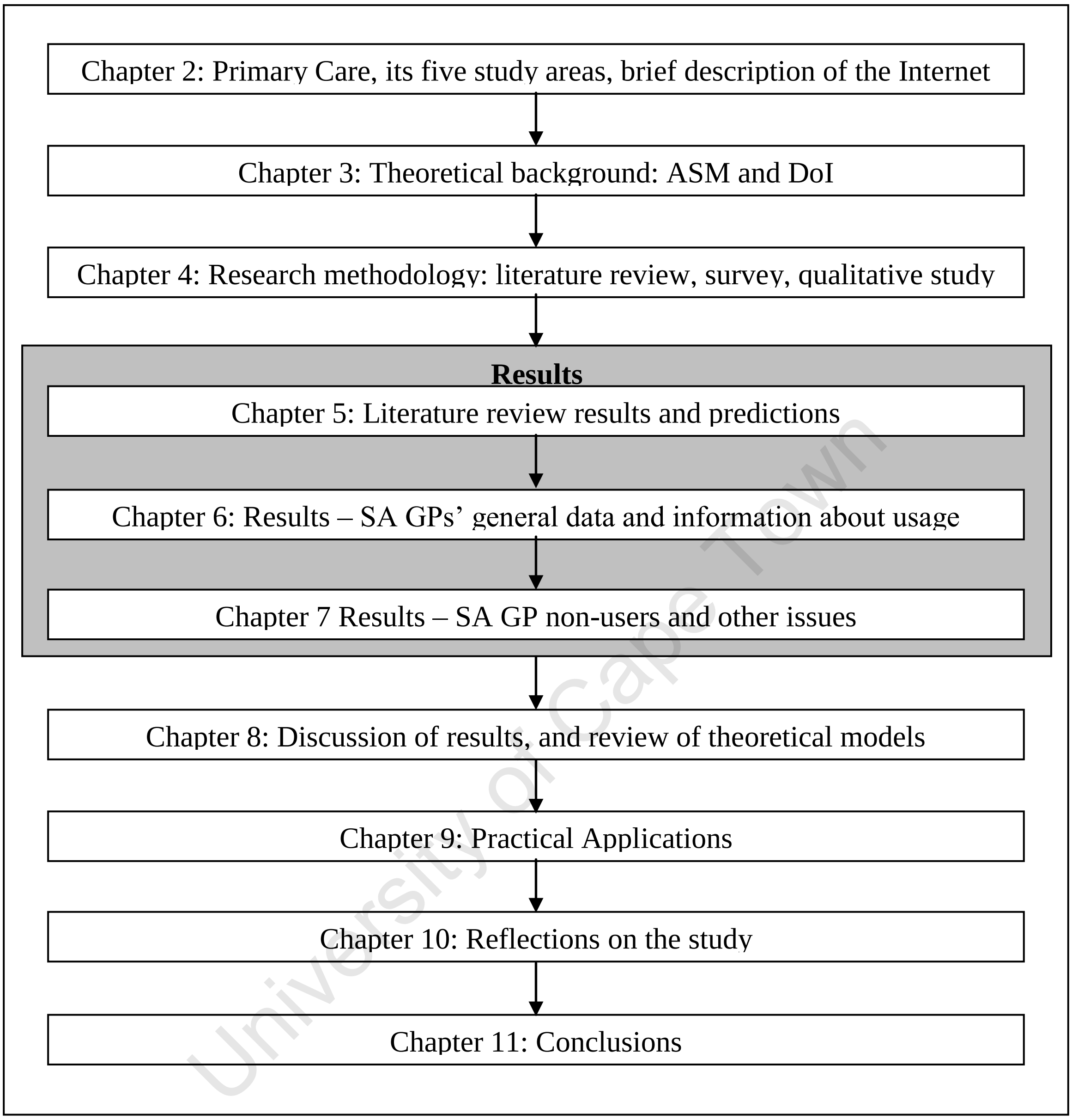
Chapter 10 will reflect on the study, and will consider the extent to which it has addressed some of the theoretical concerns, the overall study design, and the limitations of the study.

Chapter 11 will present the final conclusions to the study.

Although the thesis is laid in Chapters, all sections will carry the Chapter number and the section number.  For example, Chapter 8, Section 5.3, will be numbered 8.5.3, and will be referred to as "Section 8.5.3."  This had been done so that readers can more easily find sections referred to in the thesis.

In diagrammatic form, the structure of this thesis is as shown in Figure 1-1 below:

*Figure 1-1: Diagrammatic flow of the thesis*






## 1.8 Conclusion

This Introduction has presented the overall discipline area, medical informatics, into which this study falls. It has identified the technological focus of the study as the use of the Internet in Primary Care. It has then identified ASM and DoI as the guiding theories of the study. It has also identified the specific context, South African Primary Care, in which this study is situated.

From these converging threads, it has identified the research questions to be answered. Finally, it has detailed the overall organisation of the thesis, briefly describing the content of each chapter.

The next chapter, Chapter 2, will introduce the specific context, South African Primary Care, in more detail.

# Chapter 2: Background

## 2.1 Introduction

At the Southern tip of Africa, lies South Africa. It has a turbulent history, and has a complex society with a wide range of languages and cultures, positioned between 1st-world and 3rd-world infrastructure and systems. Its medical history is also complex – on the one hand, there are still practices that are regarded as outdated by many doctors trained in Western medicine, and large areas of the country that are seriously under-serviced [16-18]. On the other hand, it is the site of the world's first human heart transplant.

Within this environment, doctors and other health professionals practise medicine. While one would expect that many of the issues confronting medical practice in South Africa would be found elsewhere, there are also bound to be unique issues, or at least issues that are rare in other parts of the world. Overall, however, the need to deliver good health care, as it is everywhere else, is the concern of the medical professional.

This study explores the role of the South African Primary Care doctor and the practice of medicine in the Information Age. Although details of the study's concerns will be given below, it ultimately wishes to examine the role and potential impact of the Internet on the South African Primary Care doctors' practice of medicine.

The starting point, and the subject of this chapter, is to determine the issues and needs that might be addressed by the use of the Internet. To do that, the chapter begins with a brief introduction of the terminology related to Primary Care. Next, from the literature, it identifies five broad needs of Primary Care doctors, and then gives an indication of the extent to which these needs are relevant to the South African Primary Care doctor. From there, it briefly describes the nature of the Internet, and then develops a research question on the extent to which the Internet may meet these five needs.

## 2.2 Primary Care

### 2.2.1 Primary Care and Family Medicine as disciplines

In Medical Practice, the concept and definition of Primary Care is problematic, as definitions might focus on the type of physician, the activities, the setting, attributes, or overall strategies [19]. While Primary Care as "the first-contact health service for a patient who is sick or injured" [20], is a useful starting point, this is a very narrow definition. Primary Care "includes health promotion, disease prevention, health maintenance, counselling, patient education, diagnosis, and treatment of acute and chronic illnesses in a variety of health care settings" [21]. The US Institute of Medicine defines Primary Care as: "the provision of *integrated, accessible health care services* by clinicians who are *accountable* for addressing a large *majority of personal health care needs*, developing a *sustained partnership* with *patients*, and practicing in the *context of family and community*" [19].

In addition, there is a blurring between Primary Care and Family Medicine, especially when terms like "family-oriented primary care" [22] are used. In Canada, McWhinney discusses the historical development of "General Practice" into "Family Medicine" [23], and argues that there is little difference between "primary care internal medicine and family medicine" [23].

One of the principles of Family Medicine, however, is continuity of care, and value is put on the ongoing relationship between doctor and patient. The Family Medicine physician usually has had long contact with his patients, and emphasises continuity (and development) in the relationship between doctor and patient. In Family Medicine, "the continuum of care is the patient, the episode is the disease. For other specialities, the continuum is the disease, and the episode is the patient" [24].

In spite of these differing approaches, in broad terms, sustained generalist contact with a patient in the context of the family is a part of both Primary Care and Family Medicine.

### 2.2.2 Primary Care in South Africa

In South Africa, there is a further complication of terminology. Firstly, a small difference in terminology exists around the word "physician," which is reserved almost exclusively for specialists in internal medicine (whereas, in the USA, it is commonly applied as a substitute for the word "doctor.")

Secondly, in South Africa, the Primary Care doctor is usually a generalist, or general practitioner (GP), who may or may not have specialised in Family Medicine.

Thirdly, in the USA, the term "family medicine physician" is used, but in SA the equivalent is simply "family physician."

Adding to this, is the fact that the requirements for the designation of family physician in South Africa have recently changed, and a doctor will now be required to complete a Master of Medicine (MMed) degree that includes working for 4 years as a registrar, in order to qualify as a family physician.

There is also the wide range of scenarios in which the South African GP might work. These include a small, private general practice (1 or 2 doctors), or as part of a larger group, or in a clinic or Community Health Centre (CHC), and the work might be private, or state-sponsored (or "public"). A chief implication of these differing scenarios is the impact on sustained and continuing care. While the sustained and continuing care may be performed in private general practice, the situation is different in the CHCs, where doctors often rotate amongst units (such as chronic care and emergency units). Finally, the settings (urban, rural or peri-urban), discussed further below, might vary considerably. Doctors might work in a combination of these scenarios and settings.

## 2.3 Needs in Primary Care

Primary Care doctors face a range of needs in their workplace, and these are to be studied in the context of the Information Age. In the introduction to this thesis, brief reference was made to the range of possible uses of the Internet in the practice of medicine as described in the literature, specifically in research, management and electronic communication with colleagues and patients [5-8]. In its survey of American doctors' use of the World Wide Web, the American Medical Association (AMA) identified eight major areas in which the Web might be useful as a resource [25]. These were:

- Medical Information
- News and Information
- Drug Information
- Career Development
- Communication
- Patient Education
- Practice Marketing
- Business



While these groupings are a useful starting point, the difficulty of the groupings becomes apparent when others studies are reviewed. For the purposes of this study, and in the light of the literature, revisions are required. These revisions are described briefly here, and then are discussed in more detail in section 2.3.1 to 2.3.5 below.

*Medical Information, News and Information, Drug Information,*

The AMA's separation of Medical Information, News and Information, and Drug Information is problematic for this study, as it then calls for further divisions and also is at odds with other groupings in the literature (e.g., Bennett *et al*. [26] group "Drug dosing" under "Medical Information," as does the *Merck Manual of Medical Information* [27]).  For this reason, it is more logical to use the broadened term "Information" to include these first three categories.

In addition, "Career Development" includes Continuing Professional Development (CPD), and, as will be argued in Section 2.3.1 below, this is an element of career development that should also be included under "Information Needs."

*Communication*

In spite of the general group of "Communication," the AMA also distinguishes between communication with patients and the communication with "others" [25]. This distinction is reflected in other studies also.  For example, Bennett *et al*. [26] examine colleagues as a source of information, but do not study the use of email with patients.  Other studies that examine the use of physician email specifically distinguish between email with colleagues and email with patients (e.g. [28-31]). There is a need, then, when studying communication, to distinguish between communication with colleagues and communication with patients.  As a result, in this study, these two needs will be discussed separately.

*Patient Education*

As will be argued in section 2.3.4, patient education falls under a broader description of a concept already raised (in Section 2.2.1), the patient as a partner in the healing process [19].

*Practice Marketing and Business*

Also, as will be argued later (section 2.3.5), practice marketing and business activities fall under the general term of "Practice Management," which is the "the business of practice" [19].

For the purposes of this thesis, then, the activities described in the AMA and other literature will be coalesced into five areas:

- information,
- communication with colleagues,
- communication with patients,
- the patient as partner, and
- practice management.

In this section, the discussion will focus on these areas, their importance to Primary Care, and the problems associated with meeting the respective needs. These five interlinked and frequently over-lapping areas will become central Primary Care reference points in this study.

### 2.3.1 Information

#### 2.3.1.1 Information Needs

Medical Schools and Health Sciences' Faculties have recognised that rapid advances in medical knowledge means that the undergraduate years cannot be the only time that doctors are exposed to new medical information, as this will cause their medical expertise to become rapidly outdated [32; 33]. (A frequently cited statistic is that the amount of biomedical knowledge doubles every 20 years [34].)

One solution to this problem has been the move towards Problem-Based Learning (PBL) in medical undergraduate training, followed by Continuing Medical Education (CME) or Continuing Professional Development (CPD) once the doctor has qualified. (CME is not dependant on PBL, and exists also in contexts where PBL is not practised).

An important feature of PBL is that it emphasises problem-solving skills and skills that support medical students' ability to retrieve, analyse and synthesise information, so that they will be able to continue acquiring new skills and information after they have qualified [32; 35-43].

While these skills are crucial to using new information, they are the first requirement only [32].

The second requirement is CME. CME, defined as "any and all the ways by which doctors learn after formal completion of their training" [32], is now a normal part of doctors' professional lives, and is a natural extension of their undergraduate training [44-46].

CME is crucial to ensuring that doctors remain informed of the latest medical knowledge and practices after they have qualified. Indeed, Medical Associations around the world encourage "life-long learning" by CPD or similar systems, usually mandatory [32; 44; 46; 47], and often pointing to specific areas, such as Women's Health [48] and HIV/AIDS [49]. These systems frequently require doctors to earn "points" in order to maintain their practising licence.

CME can be formal or informal. Formal CME usually involves structured activities, such as instructor-led courses, grand rounds, and clinically-based teaching and seminars [50-52]. Informal CME, or self-directed learning, usually in the form of reading journal articles, books, newsletters, and discussions with colleagues, is crucial, and is considered by some researchers to be more effective than formal CME [32; 46; 50; 51; 53-58]. Informal CME is strongly personally-motivated (usually because of patient-specific needs [26; 53; 55; 58-61]), and frequently requires an immediate response to a specific problem [59; 62]. It is this need that frequently blurs the distinction between CME and information gathering. In fact, the immediacy requirement is so great, that doctors may use information that is at hand, even if not current [62; 63], often relying on personal libraries [58; 62].

#### 2.3.1.2 Problems with meeting information needs

Having the skills of problem-solving, and recognising the need for CME is part of the solution. Unfortunately, CME is not always possible. Formal CME has specific problems, such as the inability of doctors to obtain leave to attend courses [58], family commitments [64], inability to get locum coverage [64-66], distances to travel [64-66], costs of attending courses [64; 66], increased workload [57; 60; 64] and lack of time [65; 67; 68]. Barriers to informal CME are similar and wider, and also include lack of time [53; 61], isolation (and lack of access to professional colleagues) [55; 58; 61], lack of libraries and library services [53; 58; 61; 69], slow delivery of documents [53; 55], technology problems [61; 62; 69], lack of equipment, and cost [55; 61; 62; 69].

Although many of these barriers are more profound in rural areas than in urban areas [65; 68], they appear across the board, reducing doctors' access to required information and CME, and ultimately lowering the overall quality of health care [55].

It is not, however, merely the access to the information that is problematic. When obtained, the *amount* of information available can be overwhelming, and doctors struggle to accommodate it. As Pather points out "family medicine is…the field in which the amount of guilt is directly proportional to the number of unopened journals" [70].

In summary, the problems caused by the rapid change in medical information and procedures have been partially resolved by changes in medical curricula and by encouraging CME. This reliance on CME, however, has its own problems of accessibility to current and relevant material and other sources of information. These problems need solutions.

### 2.3.2 Communication with colleagues

#### 2.3.2.1 The need to communicate with colleagues

The doctor, of course, is not alone. Apart from formal referrals, there is a need for communication amongst professional colleagues for advice and assistance with diagnosis. Where advice like this is required, colleagues are often the first port of call for information [26; 71].

In addition to interaction for diagnostic purposes, doctors interact with a broader medical community, communicating with professional bodies and for other activities such as participating in drug trials.



#### 2.3.2.2 Problems with meeting the need to communicate with colleagues

While doctors working in large practices or hospitals might have relatively easy access to colleagues, for doctors working in smaller practices or in isolated rural communities, access to the medical community is not always convenient or possible [62]. This problem is compounded by the lack of access to, and sharing of information with, doctors who are considered experts (or "educationally influential" doctors); a process that is recognised as essential for diagnosis and treatment of patients and the provision of good health care [50; 61-63; 72-74].

In addition, there is evidence that synchronous communication (such as face-to-face, or telephonic) with other doctors can be disruptive to *their* medical practice, and therefore dangerous to *their* patients [75], so one must weigh the need to communicate against the disruption of this medical service.

In summary, essential communication between health professionals is currently being hampered, or is occurring in ways that might be detrimental to the delivery of health care.

### 2.3.3 Communication with patients

#### 2.3.3.1 The need to communicate with patients

In Primary Care, effective communication between doctor and patient is extremely important, and leads to greater patient satisfaction and better delivery of health care [23; 76-86].

In recognition of this need, international medical associations have strongly recommended that communication skills be taught as part of the undergraduate training, and many medical schools have built communication skills into their curricula [76; 87-91]. CME is useful for maintaining these communication skills [89;

92] because, if these skills are not reinforced in later years, they quickly decline [87; 89].

#### 2.3.3.2 Problems with meeting the need for communication between doctors and patients

Several problems occur in the communication with patients. The most striking is language and cultural differences that place barriers between the health professional and the patient [93-95]. Although interpreters can solve some of these, the use of interpreters frequently leads to the patient's receiving incomplete or incorrect information, sometimes with potential clinical consequences – this danger is significantly increased if *ad hoc* rather than professional interpreters are used [93; 96; 97].

Even if the patient and doctor speak the same mother-tongue, the medical jargon, evasion of direct questions, and fear that the doctor is too busy, all contribute to patients' dissatisfaction and confusion [98; 99]. This is especially true with children, adult patients who have less than a university education, or with elderly patients [85; 100-104].

The consultation can also be a high-pressured situation for the patients, during which they (and the doctors) have to think on their feet, answering clearly, concisely, fully aware of limited time [105; 106]. There is little time to reflect before answering. The breakdown in communication leads directly to mistrust, anxiety, doctors' acting on incomplete information, and ultimately, a failure of good health care delivery [98; 106].

Good communication requires time, and, if the only contact that a doctor has with a patient is in the consultation, then this good communication requires a lengthening of the consultation [80; 107; 108].

In summary, good communication with patients is crucial to the delivery of good health care, but the identified barriers that prevent good communication can result in poor health care delivery, and need to be removed.

### 2.3.4 Patients as partners

#### 2.3.4.1 The need to have the patient as partner

In a "quiet revolution" [109], patients are increasingly being viewed as active partners in the healing process, contributing to their own well-being [38; 49; 81; 110-116]. Some researchers go further, and make the strong point that "Patients, not healthcare providers, are the primary managers of their health conditions" [117]. This is part of the "patient-centred" approach (in which the patient's expectations and experiences play a crucial role), as opposed to a "doctor-centred" approach [23]. It is not "that the patient is put in the middle and then all the 'really smart, professional people' stand around and try to decide what's best for that person" [118]. Rather, the consultation is "a meeting of two experts – the patient as an expert on the experience of his or her own illness and the family physician as an expert on disease and the practice of medicine" [119].

It does not, however, mean that both doctor and patient have equal roles. The relative contribution may differ from patient to patient, but both patient and doctor agree on goals and the ways to reach them and that the patient's values are taken into account [19].

Although the concept of informed consent has long been considered essential [79], the patient as partner goes further than merely consent. The patient is not an object acted upon, and not merely informed by the doctor, but is an active participant in the exchange of information and the delivery of health care [81; 109; 110; 117; 120-122].

To participate in this shared decision-making, and, by extension, effective provision of health care, the patient needs to be well-informed [120; 121; 123]. Patient education, then, is crucial to good health care delivery. Not only has this been demanded by patients [124], and is often underestimated by doctors [123], but is highly beneficial [122]. For example, pre-operative education has been found to have important benefits, including faster recovery [124], and this type of education has extended into patients' visiting recommended Internet sites before surgery [125]. Formalised Patient Education is sometimes referred to as "Information Therapy" [126], with the advice given by doctors known as "Information Prescriptions" or IPs [127; 128].

#### 2.3.4.2 Problems with having the patient as partner

Because the patient needs information to participate as a partner, accurate information must be available to that patient. If patients feel that their doctors are not supplying the required information, they are bound to obtain that information from sources other than their doctors. As medical history has shown, "If the [medical] profession is failing to meet a public need, society will find some way of meeting the need, if necessary by turning to a group outside the profession" [23]. One can expect that this applies to the patient's need for information.

There are, however, great concerns regarding patients' accessing information from other sources, and the impact that this may have on the doctor-patient relationship. Apart from a lack of control of the quality of the material, a patient who is well (or badly) informed by sources from outside the doctors' scope alters the doctor-patient relationship [129-133]. Some doctors believe that patients' access to information and their greater control over the healthcare process is to be welcomed [116; 134-136]. Other doctors feel more stressed by the challenges from well-informed patients [45]. In addition, there are also problems of lengthening consultation periods, already a large problem for doctors [137], and sometimes eroding the patients' lack of faith in the doctor [133].

The material accessed by the patient must not be only *accurate*; it must be accurate without being *too complex*. While research has long shown the benefits of good patient education brochures [138], for the layperson, medical jargon is initially impenetrable, and there is the concern that patients cannot understand even basic material [99; 111; 120; 139-143]. As a result, patients without the necessary medical background (or "health literacy" [120; 121; 132; 144; 145]) can become misled and confused, even when the information has been explained by the health professional, unless "patient-centred communication" is practised [79; 95; 146-149].

The problem, then, is that, to fully participate as partner, the patient needs access to information that is both accurate and not too complex; further, if that information is not given by the doctor, the patient will attempt to find it elsewhere, without guidance from the doctor.

### 2.3.5 Practice management and administration needs

#### 2.3.5.1 The need to have practice management and administration

Practice management consists of "systems (structures and processes) meant to enable the delivery of good quality patient care" [150]. It is "the business of practice" [19], and involves activities that are usually hidden from the patient, but which are crucial to the delivery of Primary Care. These activities typically include maintaining patient records (including transferring and receiving during referral or patient relocation), receiving diagnostics tests (such as x-rays and blood tests), patient billing and accounting, and following up with health insurance schemes. Specific activities will differ considerably depending on the nature of the medical practice, whether in a hospital or clinic, private practice or public sector, and, in larger practices, might not impact significantly on the doctors' time, as they would be performed by administrative staff [151].

#### 2.3.5.2 Problems with practice management

The systems on which patient's bills are based can be a "Byzantine array of cross-subsidies, hidden taxes, and conflicting incentives" [152]. (One of the appeals of the UK National Health System (NHS) was the absence of billing [153].) Further, complexities of billing can lead to the under-reporting of services; these and similar issues lead to large revenue losses [154].

In addition, patient records require updating so that they are complete and accurate, and they need to be transferred quickly. In one observational study, researchers found that up to 81% of the time, "physicians could not find all the available patient information desired to make patient care decisions during an outpatient encounter" [155]. Given that sustained patient care is crucial to Primary Care, this type of situation has both an immediate and long-term impact on the patient.

Paper records are particularly problematic. Over time, as the patient file expands, there is the difficulty of finding the required information in the mass of data [156], and the total amount of paper used in paper records is enormous [157]. In addition, on a national level, while patient records are an invaluable source of information for trends, obtaining this information from paper records is time-consuming and costly [155].

In summary, in practice management, there are several problems that need to be overcome. These include errors and delays in billing and claims, the late receipt of patient records, inaccurate and incomplete patient records, and an overwhelming amount of information that obscures the required data.

## 2.4 Needs and problems in the South Africa context

Although this thesis uses Primary Care as a general context, it is directly concerned with Primary Care in South Africa. There are certainly similarities between the needs of South African Primary Care and Primary Care in the rest of the world.

On a general level, the South African Medical fraternity adheres to international standards. This is common in most professional disciplines, with many having nationally and internationally recognised and recognisable standards, ethics, approaches and practices [130]. Doctors are no exception. I will not argue that a "doctor is a doctor," for, even within nationalities, differences between doctors' values occur. In spite of these differences, however, there are internationally accepted standards for research and practice – methods of conducing drug trials, methods of defining efficacy, and so on. This is because medical research itself is based upon its own theoretical perspectives and practices.

More specifically related to this thesis, in line with international standards, many South African Faculties of Health Sciences have introduced PBL into their undergraduate training, and several have built training of communication and other patient-centred skills into their curricula, frequently drawing on multi-professional activities [158; 159]. This approach is in recognition of the need for ongoing education, and the changing roles in the patient-doctor relationship.

South African doctors also maintain their level of professional expertise through formal and informal CME, and are obliged by the Health Professions Council of South Africa (HPCSA) to earn 30 CPD points per year [70; 160]. The process of earning points is similar to international practices, and usually involves activities such as attending CME courses, meetings, seminars, and answering multiple choice question (MCQ) questionnaires in journals [161].

Given South Africa's lack of physical infrastructure compared to North America and Europe, doctors in South Africa are likely to face the same or greater hurdles to accessing CME materials, as doctors elsewhere. In South Africa's rural and other under-serviced areas, this is likely to be greatly exacerbated [162; 163]. (In this thesis, the term "under-serviced" areas will follow the general usage in the literature of referring to rural areas or areas of similar lack of infrastructure, such as "underserved," "peri-urban settlements," informal settlements," or "urban townships" [164-172], and will be discussed again later in the thesis (Section 6.5.3.3).



Patient-doctor communication problems are also prevalent in South Africa because of a range of cultures and languages [173], but a balanced and globally contextualised assessment is useful. The scope of the problem is difficult to assess accurately, because, while the percentage of the population that has English as a first language is small, this information is misleading, as it ignores the number who have English as a second or third language. In 1991, estimates from the Central Statistical Service were that 49.1% of all South Africans over the age of seven read and write English [174], while other, perhaps disputed, estimates are higher [175]. The tendency to have more second-language English speakers than first is neither strange nor unique to South Africa, and is an international trend [176]. In addition, although the English language skills level of English second-language speakers might be questionable, it should be seen against an international figure that is also variable. In the USA, for instance, 1992 estimates were that some 22% of American adults are barely able to read a short piece of text and locate a piece of information in the text, and yet 66 to 75% of that 22% "described themselves as being able to read or write English 'well' or 'very well'" [177]. Later research indicates that literacy rates in the US have declined to a point where "little more than one-third of high school seniors now read proficiently" and the percentage for adults is less than half that figure [178]. In general, where literacy is measured on a global scale, South Africa performs less well than most developed nations, but better than the global average, and far better than the rest of Africa [179].

The problems with patient communication are compounded by the fact that South Africa has a lack of trained translators, and frequently nurses serve as translators or interpreters [101]. As noted earlier, this situation is potentially dangerous to patients [96].

In much the same way as described above, doctor-patient communication problems will present similar challenges for the delivery of health care in South Africa.

In essence, SA GPs face problems that are similar to or greater than those that occur in the rest of the world. They must meet comparable standards of medical practice, grapple with issues of CME, and interact with other colleagues and patients under trying circumstances. These problems need solutions.

## 2.5 A way forward

### 2.5.1 The Internet

Five needs of Primary Care, and the problems associated with those needs, have been discussed. Those needs rely heavily on the access to information, and communication between various parties, especially in the light of the changing nature of the doctor-patient relationship.

The impact of new information and the increased communication in the health professions has not occurred in a vacuum. Within the past 20 years, the world's focus on the importance of information, its delivery and use, has developed and evolved dramatically.

The tool driving this revolution is the Internet. Given the Internet's role in the delivery of communication, it is plausible to propose that it might be used to solve some of these problems in South African Primary Care, and, in doing so, encourage better health care. Of course, it may also introduce new complications, and rushing headlong into the latest technology without due understanding of its impact in different contexts, and putting health care at risk, is to be avoided.

At this stage, it is prudent to understand a little of the nature of the Internet, and the steps be followed in determining the suitability of using the Internet to meet these needs in South African Primary Care.

### 2.5.2 The nature of the Internet

The Internet was born chiefly from the US military's Advanced Research Project Agency Network (ARPANET), and is the physical infrastructure through which much of this information is available. In 1994, the first World Wide Web (WWW) Conference was held at CERN, Geneva. Although the Internet had existed for some time, the "Web," with its system of easily accessible pages and hyperlinks, transformed the Internet from a tool requiring a high degree of technical ability to a tool requiring little more than the ability to double-click an icon.

The value of the Web to health care had long been recognised by the Web's chief architect, Tim Berners-Lee [180], and, by 2001, a Pew report indicated that 52 million Americans had used the Web to obtain health or medical information [181]. By 2004, this figure had increased to 95 million [147], by 2006 was 113 million, constituting 80% of the US Internet users [182], and by 2007 was estimated to be at 122 million [183]. On any typical day, some eight million Americans search the Internet for health-related information [182]. Similar figures have been reported from other developed countries [184].

The potential of the Internet (including email, discussion groups, blogs and wikis) has not been ignored by Health Professionals [83], but it is a fast-evolving technology. There is a need, as Coiera pointed out as early as 1995, to ensure that the focus of the information technology use is not on the technology, but on solving clinical problems [6].

## 2.6 The Internet and needs in South African Primary Care

From the information given above, there is the possibility that the Internet might be used to meet the identified needs in South African Primary Care. Indeed, it would be tempting to say simply "Let us encourage the use of the Internet where it is already being used in South African Primary Care, and let us adopt it where it is not being used."

Caution, however, is required: we should not rush headlong into simply adopting a technology into the workplace without understanding the deeper implications of doing so, and without due consideration to the current local environment and practices, because there are several sets of questions that need to be asked and answered.

Firstly, what is the nature of the environment in which the activity of Primary Care occurs? Apart from the descriptions given in the earlier part of this chapter, it is necessary to understand this from a theoretical or abstract view. When that is understood, one can consider the role that would be played by the Internet in this environment, and the methods applied in studying such a phenomenon.

Secondly, while the descriptions of Internet usage given above are useful starting points, it is necessary to obtain more details about the type and amount of usage, the motivations, and the barriers. For this, a more detailed and systematic review of the international literature will need to be conducted.

Thirdly, and echoing the international information, it is necessary to know the extent to which the Internet is currently being used by South African general practitioners, the motivations and the barriers. This will allow for a pin-pointing of problems and issues that are specific to South Africa.

Only once these are clearly understood, can one then discuss the various realistically possible applications.

On a practical level, this thesis will attempt to answer the research question:

*What can be done to ensure that the Internet is used to best serve the needs of South African Primary Care doctors?*

Clearly, while the needs of the Primary Care doctors are varied, this thesis will concern itself with those needs discussed in this chapter. The theoretical models developed to answer this question will focus on these needs, which, in effect, become *five areas of study*.

These five areas of study can be summarised as the doctors:

- information needs,
- need to communicate with colleagues,
- need to communicate with patients,
- need to have the patient as partner, and
- practice management needs.

## 2.7 Conclusion

This chapter has introduced the concept and nature of Primary Care, both in general and in the South African context. Although there are many issues crucial to the delivery of Primary Care, five of them have been identified from the literature, and their significance both in Primary Care in general and in Primary Care delivery in South Africa in particular has been presented.

They have been developed as needs that will form five study areas of Primary Care. As the thesis develops, discussions and solutions to problems will be seen in the context of these five study areas.

These five study areas are the doctors':

- information needs,
- need to communicate with colleagues,
- need to communicate with patients,
- need to have the patient as partner, and

- practice management needs.

Finally, and extending the practical evidence that emerges from these five study areas, this thesis has presented a practical question to be answered: *What can be done to ensure that the Internet is used to best serve the needs of South African Primary Care doctors?*

In the next chapter, this thesis will examine the theoretical perspective that will assist in understanding the South African Primary Care's doctors' use of the Internet.

# Chapter 3: Theoretical Background

## 3.1 Introduction

In the previous chapter, five areas of study in Primary Care in South Africa were identified, and the use of the Internet in the workplace was proposed as a possible solution to the reported problems.

To understand the implications of introducing the Internet into the workplace, it is necessary to understand the dynamics of the workplace, including the various interactions that occur there.

This chapter will begin with an explanation of Yrjö Engeström's Activity Systems Model and the way in which it describes the interactions amongst people and organisational systems in the workplace, with specific reference to medical practice. Next, the chapter examines the adoption of technology, describing Everett Rogers' theory of Diffusion of Innovations, and its limitations in regard to this study. Finally, the development of two theoretical research questions is discussed.

## 3.2 Activities and change

The five areas of study can be represented as activities within a specific environment, usually a doctors' consulting room, clinic or hospital. The doctor does not work as an automaton, merely performing routine tasks irrespective of the context. Instead, the doctor's activities involve the use of medical tools influenced by knowledge and experience, guided by acceptable standards and ethics, mindful of limitations in scope, and, above all, motivated towards a particular goal: the delivery of the best possible health care. Of particular importance is the fact that the environment changes, and the doctors' activities need to adjust to these changes in much the same way that any business needs to adjust to a changing business environment.

The introduction of a new approach or system within a business or organisation causes change and impacts on the overall operations of that business or organisation. A range of theories has been used to describe, understand and cope with the process of organisational change. In the private sector, for example, an approach popular in the 1990s was "Business Process Reengineering (BPR)," designed to "help organizations fundamentally rethink how they do their work in order to dramatically improve customer service, cut operational costs, and become world-class competitors" [185]. Although BPR gave insights into the effect of change, in practice, it often led to an over-emphasis on the financial bottom line, layoffs, and, in the words of one of its creators, "mindless bloodshed" [186]. Other researchers have also concluded that it was not as context-sensitive as it needed to be [187]. The need for context-sensitivity, especially to socio-economic context of work, is particularly relevant to medical practice.

Similar to BPR, however, other business models of change are typically aimed at large businesses undergoing a single and rapid change, and the use of change models is aimed at assisting and managing the change in a co-ordinated and structured fashion, as quickly as possible [188].

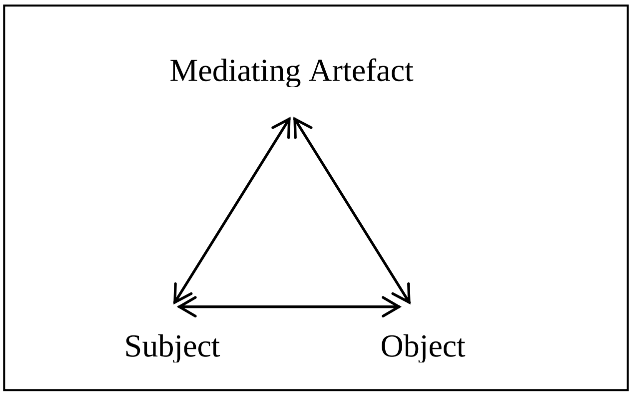
From the earlier discussion on Primary Care, however, especially within the South African context, it is evident that Primary Care in South Africa is delivered through a wide range of different organisational types, including both large and small, private and public hospitals, clinics and practices, and across a range of socio-economic environments. In a large hospital, many operational decisions may be made by administrators not directly involved in patient care. In the smaller clinics and practices, however, many of these operational decisions will be made by the doctors themselves. For this reason, a standard business model like BPR that might work in one area of SA Primary Care cannot easily be transplanted to another.

It is primarily for this reason that a useful starting point is a model that is cognisant of the socio-economic context, and which has also been used extensively in different health care delivery situations. This starting point is Yrjö Engeström's Activity Systems Model (ASM).

## 3.3 Activity Theory

In the early 20th century, Activity Theory was introduced to the world as cultural-historical activity theory by Lev Vygotsky and Alexei Leont'ev [189; 190]. Based on research in psychology, Activity Theory was aimed at explaining the interactions between an individual and the environment, including other individuals. The model describes the interactions between people (subjects), and objects of their environment [189]. This interaction might be direct, or might be through a mediating artefact. The model is presented as a triangle as shown in Figure 3-1.

*Figure 3-1: Vygotsky's model of interaction between Subject and Object through a mediating artefact.*




For example, the Subject might be a child, and the Object the environment (including other people) with which the child interacts by touching. Alternately, the child might interact with people via the mediating artefact of language.

Important for the model is the concept of change. As components of the model change, this affects the interactions and results in new interactions, and even changes in the components. For example, in his discussion of child psychology and learning, Vygotsky discusses the transition occurring within a child as its problem-solving abilities improve. In this development, the child passes through a "zone of proximal development" from having one set of problem-solving skills to another. In metaphorical terms, Vygotsky says: "The zone of proximal development defines those functions that have not yet matured but are in the process of maturation, functions that will mature tomorrow but are currently in an embryonic state." [189]

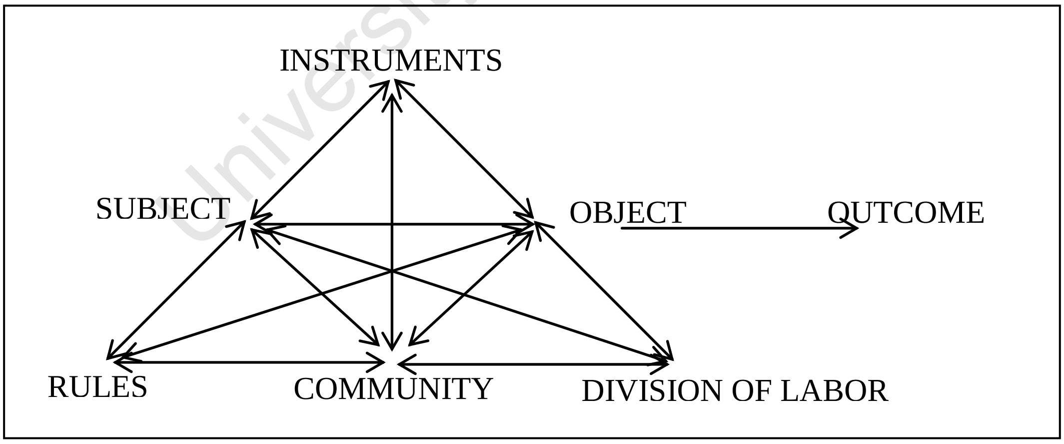
## 3.4 Activity Systems Model

### 3.4.1 The basics of the model

Yrjö Engeström [191] draws on and further develops the work of Vygotsky and Alexei Leont'ev, and develops a model showing the "Structure of human activity" [191] or the "Mediational structure of an activity system" [9]. He then demonstrates its application to the workplace environment [9]. To Vygotsky's triangle, Engeström adds a second tier, representing the professional context in which the activity occurs.

Figure 3-2 below is a diagrammatic representation of the interactions in the workplace, the activity, as described in Engeström's Activity Systems Model (ASM) [9].

*Figure 3-2: The components of Engeström's Activity System.*



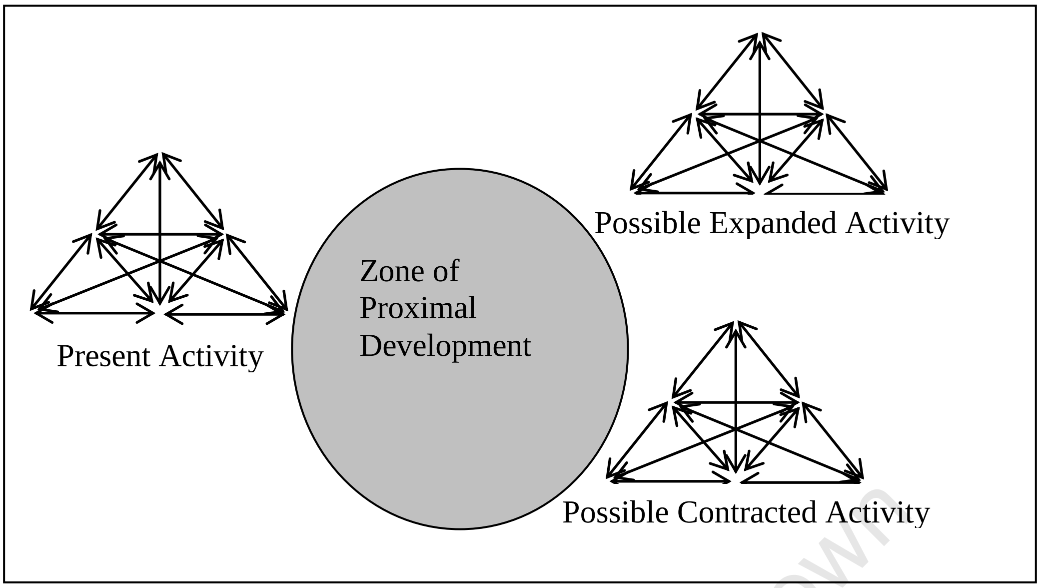

In Figure 3-2, the subject is the chief actor, the object is the environment or focus of the action, and the instruments mediate the activity. There are also social mediators that impact upon the activity, such as rules of the community, and the impact of division of labour. The outcome is the goal of the activity.

But Figure 3-2 is a description of the current activity only. A disruption occurs. This disruption might be a new instrument, or a change in the rules, or an event affecting any of the components.

Because of this disruption, contradictions emerge. These contradictions are incongruencies between the various aspects of the interaction, preventing a smooth functioning of the workplace activity.

There is a need to resolve the contradictions, so that the smooth-functioning can return. One first needs to identify the contradictions, so that they can be resolved. Once this has been performed, a description of a new and desired environment (an "expanded activity") emerges. In his "Theory of Expansive Learning" [10; 191; 192], Engeström draws further on Vygotsky's work, and identifies the difference between the current activity and the new expanded activity as the zone of proximal development, and it is this zone that needs to be crossed by practical applications of resolutions to the contradictions. Failure to resolve the contradictions results in a worst-case scenario of "contracted activity," in which the contradictions remain, and prevent the smooth functioning of the activity [9]. This process is depicted in Figure 3-3 below.

*Figure 3-3: The relationship between the Present, the Possible Expanded, the Possible Contracted Activities, and the Zone of Proximal Development.*

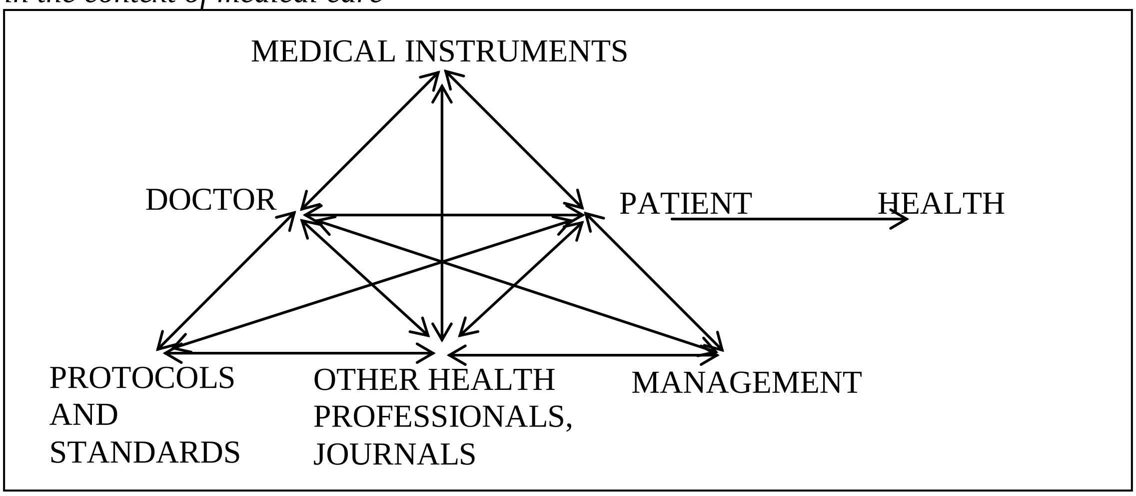



### 3.4.2 ASM in medical practice

ASM is particularly suited to explain some of the dynamics in the Primary Care workplace. Not only is the theory aimed at understanding the workplace in general, but, many of Engeström's applications and examples are from the field of medicine [9-14].

Figure 3-4 shows Engeström's triangle in the context of medical care [14].

*Figure 3-4: A diagrammatical representation of Engeström's Activity Systems Model in the context of medical care*



In the medical working environment, the subject is the doctor, or, in a hospital, the hospital staff; the object is the patient “with his or her health problem or illness” [9]. The patient and care givers are linked by the activity, and the “patient carries the fundamental motive for hospital workers” [9].

A detailed description of the other components of the model in the context of primary care is given as follows:

> The outcomes include intended recoveries and improvements in health, as well as unintended outcomes such as possible dissatisfaction, non-compliance and low continuity of care. The instruments include such powerful tools as X-rays, laboratory, and medical records - as well as partially internalised diagnostic and treatment-related concepts and methods. The community consists of the staff of the clinic, distinguished from other competing or collaborating clinics and hospitals. The division of labour determines the tasks and decision-making powers of the physician, the nurse, the nurse’s aide, and other employee categories. Finally, the rules regulate the use of time, the measurement of outcomes, and the criteria for rewards. [14]

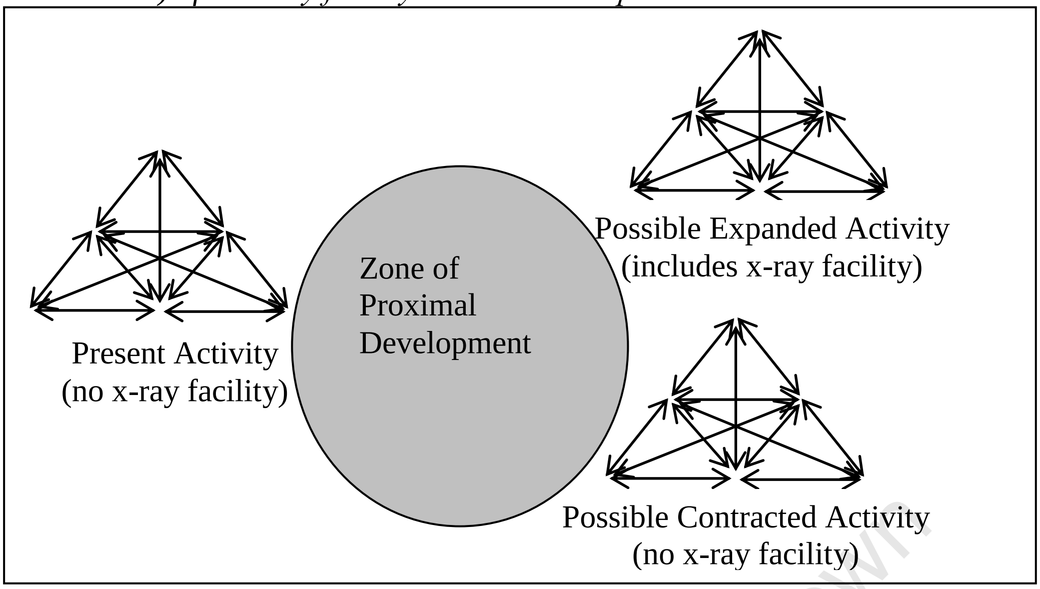
From the sense of the description, the term “clinic” can include private practice.

There is also an internal contradiction in the object between its “use value” and “exchange value.” In the medical scenario, “this takes the form of patient as person to be helped and healed *versus* patient as source of revenue and profit." This contradiction is called the "primary contradiction" [9].

The possible disruptions and their possible contradictions, in this setting are numerous. Doctors change, hospitals change, and, very importantly, patients change. Engeström uses the example of a village doctor who faces demands for improved technology, such as X-Rays, because the patients have seen this technology in a new district hospital in the city. Because the doctor does not have these instruments, the situation "leads to a secondary contradiction between the *new kind of object* – patients demanding technological medicine" [9]. These contradictions "manifest themselves through disturbances, ruptures and small unremarkable innovations in practitioners' everyday work actions" [9].

In this example, the disruption causes the activity to move through the zone of proximal development to one of two possible activities. The expanded activity will be the activity in which the new instrument (the x-ray facility) is utilised. The contracted activity will be the activity in which the new instrument is not utilised. Important to note is that the contracted activity is not simply business-as-usual, for the context (including other practitioners, patients' expectations) has also changed, and so the level of activity within that context is compromised or contracted. This process is depicted in Figure 3-5 below.

*Figure 3-5: Crossing the zone of proximal development with the introduction (or non-introduction) of an x-ray facility into a doctors' practice*






### 3.4.3 Further complications

In studying professional discourse, specifically in the relationship between doctors and patients, there is greater complexity regarding the object.

Firstly, there is the need to understand the patients' history of illness over their life course, their current interactions in the relatively recent period, and then an understanding of interactions within recently purposefully arranged interventions.

Secondly the object needs to "gain a voice." In studying discourse, then, there is now a subtle shift from the object as patient [9] to the object as "the illness and the care" with the patient as the co-producer of the object [12]. Even so, "the patient is a silent co-producer whose agency, if noticed at all, is noticed mainly after the fact, when problems of non-compliance come up" [12], and when "the object becomes a speaking object" [12]. It is clear, then, that although the patient has been given an active role, he or she remains the object.

Thirdly, there is a need to "expand the object" [12], which involves understanding in detail the history of the patient, developing an overall model of the care currently received, and then developing the overall care strategy.

## 3.5 Primary Care in the light of ASM

From the discussion above, it is obvious that the five study areas raised in the preceding chapter are echoed in ASM. The relationship between the five study areas and the ASM, as depicted in diagram 3-4 above, are reinforced here.

*Information:* In Engeström terms, the subject (or doctor) must be kept aware of changes in the instruments and rules, and adapt to these changes in order to resolve disturbances in the activity, so that the desired outcomes are achieved.

*Communication with Colleagues:* The subject must also interact and communicate with the community, more specifically, the professional community of fellow practitioners, who, themselves, are governed by the rules. (At this point, it is important to note that this use of the word "community" is different from the use of the word in the usual Primary Care sense, where the word refers to the social community of the patient – the object). Engeström argues that the "the different caregivers and the patients need to learn to produce together well coordinated and highly adaptable long-term care trajectories" [193].

*Communication with Patients:* The subject must also interact and communicate with the object, for it is this interaction that will lead directly to the desired outcomes. Both subject and object interact with the instrument. In Engeström's terminology, the doctor's instruments will keep pace with the demands of the community and the object.

*The Patient as Partner:* In the discussion of Engeström's model, there is a somewhat uncomfortable description of the patient as the object. There is a shift from the patient as object [9] to "the illness and the care" as object, with the patient as the co-producer of the object [12]. However, in spite of the fact that the patient "gains a voice," he or she remains a "speaking object" [12].

In practice, this shift is part (but not all) of the transition from "patient as object" to "patient as partner." As shown in the preceding chapter, the *relative position* of the patient as object is changing, and this presents a new set of challenges. With this change in relative position, the *nature* of the object and the nature of the interactions between the object and other elements in the model will change. The most obvious, discussed in detail in the preceding chapter, is that, in order to move from pure object to "object with a voice," the patient should be fully informed. To be fully informed, the patient accesses information from sources other than the doctor.

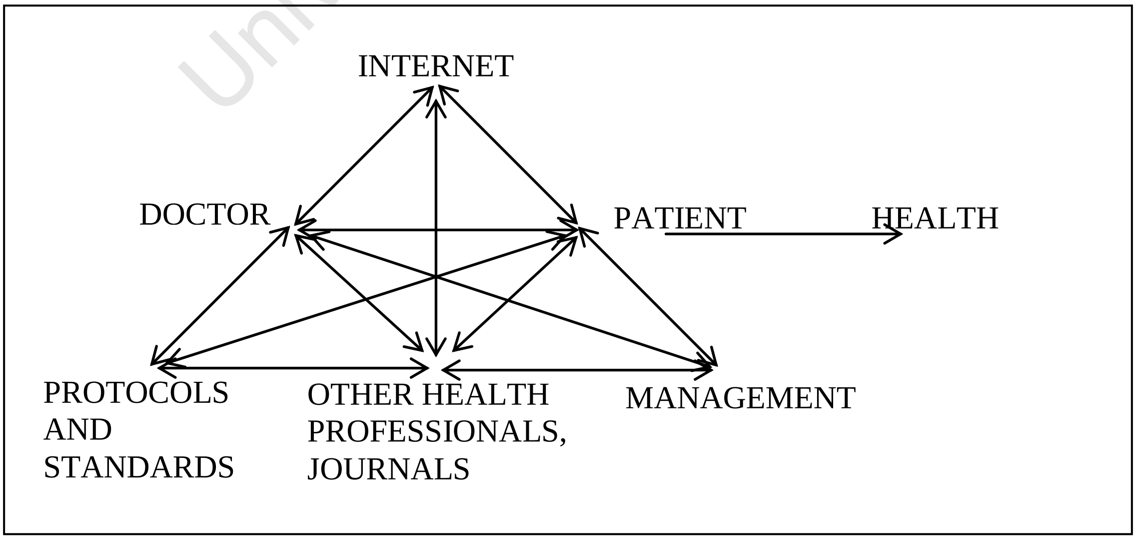
It appears, then, that medical practice is moving one stage beyond the depiction in Engeström's model of "object with a voice." The new role of patient as partner, while opening new possibilities in health care, also places a greater burden on both doctor and patient, and has the potential to cause complications in the delivery of health care. Many of these complications appear to be derived specifically from the information and communication sources available to the doctors and patients.  This will be explored in detail throughout this thesis.

*Practice Management:* The doctor works within the rules set out by his professional community, especially in the larger practices, where a division of labour is explicit. For example, secretaries and receptionists perform much of the administrative work.

## 3.6 Introducing a new instrument

If the Internet is to be introduced into the scheme shown in Figure 3-4, it is clear that its position will be as an instrument [194].  As a result, Figure 3-6 shows the working model that serves as an analytical framework of the study.

*Figure 3-6: Labelling of Engeström's model within the context of health care delivery, with the function of the Internet as a mediating artefact.*



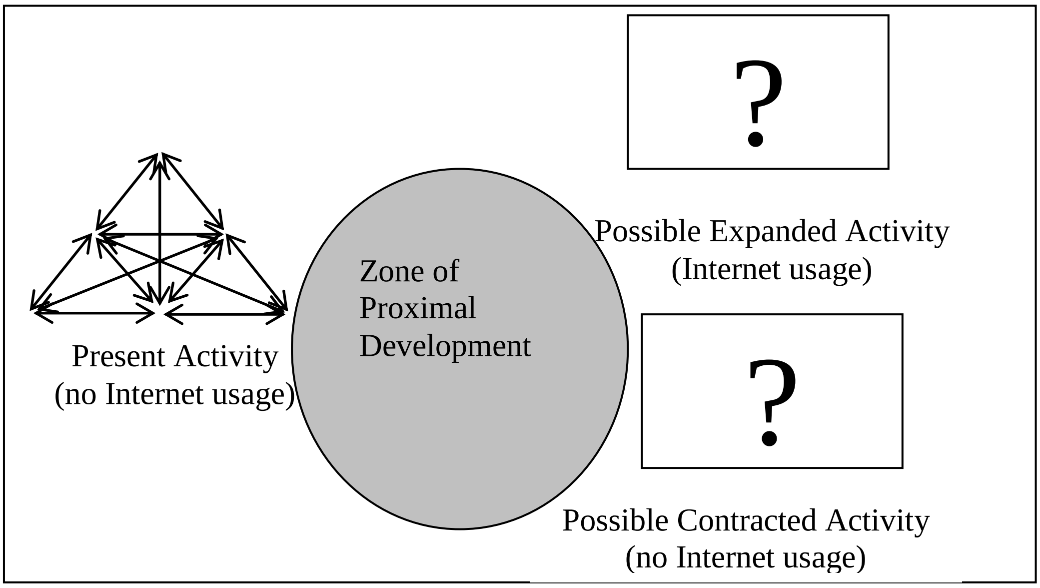
Both doctor and patient may be able to interact with the Internet to obtain information so that they may participate as partners in meeting the goal of health care delivery. Similarly, the community and other components of the model may be able to interact with the Internet for information.

The Internet, however, is not a simple tool, but a complex technology, with a wide variety of applications and far more complex than the X-Ray instrument that Engeström uses in his example, and, therefore, carrying with it far greater implications.  Perhaps the most striking is its role as a communication channel. Because it is a communication channel, it is possible that subject and object may interact with each other *through* the new instrument.

As a result of this complexity and range of applications, and the fact that the Internet is a mode of communication, the possible expanded and contracted activities may not be as straight-forward as presented in the previous diagrams.  For that reason, the projected possible expanded and contracted activities are unclear, as shown in Figure 3-7, and are the subject of this thesis.



*Figure 3-7: Crossing the zone of proximal development with the introduction (or non-introduction) of the Internet*



ASM's strength lies in its analysis of the role of the instrument when it is introduced, the contradictions it causes, and possible changed set of activities that may result. While ASM describes interactions with the sociological context, it focuses on the workplace, and does not describe the development of that sociological context. For the purposes of this thesis, however, it is necessary to begin on a broader level, at the points leading to the adoption of the technology before the contradictions and disruptions occur. For this, it is necessary to look more closely at the processes involved in the adoption of this technology.

## 3.7 Theories of adoption

There are a number of theories describing the adoption of a new technology throughout a society. Some of these, derived primarily from psychology, focus on the individual's decisions. A popular example is Fred Davis's Technology Acceptance Model or Technology Adoption Model (TAM) [195; 196], which was adapted from the work of Ajzen and Fishbein's "Theory of Reasoned Action" (TRA) [197; 198]. TAM focuses on the perceived usefulness and perceived ease of use as two variables for determining adoption of a technology. While these variables are useful measure, as is demonstrated in Davis own work [195], they over-simplify the process, and ignore a host of sociological factors, and the diagrams with specified paths of action indicate the extent to which TAM is strongly deterministic.

This weakness was recognised by Davis himself [195], and a later extension of TAM by Venkatesh and Davis, called TAM2 [199] introduced a measure of social influence. More recently, in 2003, Venkatesh, Davis and colleagues created a

“Unified Theory of Acceptance and Use of Technology” (UTAUT) [200], which “posits three direct determinants of Intention to use (performance expectancy, effort expectancy, and social influence) and two direct determinants of usage behavior (intention and facilitating conditions)” [200].

Supporters of TAM, and the derivatives, concede that TAM’s simplicity is a limitation. As Bagozzi points out, “in favoring a simple model, researchers have overlooked essential determinants of decisions and action, and turned a blind eye to inherent limitations in TAM” [201]. Researchers should not assume that TAM can be used to “explain decisions and behavior fully across a wide range of technologies, adoption situations, and differences in decision making and decision makers” [201]. The later attempts at solving the problem of simplicity have frequently resulted in over-complexity. UTAUT, for example, introduces complexities, one of which is the minimum of 41 independent variables needed for prediction [201].

As the discussion on Engeström’s ASM points out, this thesis concerns itself with the introduction of the Internet as an instrument in the five areas of study in a particular sociological context. This is highlighted particularly by the importance of the doctors’ communication with patient, the doctors’ communication with colleagues, and the development of the patient as partner. As a result, TAM does not meet these needs: the remnants of its determinism, the rather late add-ons of broader sociological issues, and the complexity introduced by these do not make it entirely suitable for analysing the data in this study.

In view of TAM's limitations, another prominent theory that examines the adoption of technology from both a psychological and sociological view, Everett Rogers' theory of "Diffusion of Innovations" (DoI) [15], is exploited. The features and limitations of DoI will be closely examined here.

## 3.8 Diffusion of Innovations – an overview

Rogers' work on DoI was first published in the 1960s, and is now in its fifth edition [15]. In 1997, Rogers and Scott gave the following description of the theory: "Diffusion is the process by which (1) an innovation (2) is communicated through certain channels (3) over time (4) among the members of a social system" [15; 202]. These four elements form the basis of DoI. In Rogers' writing, the "members of a social system" are often referred to as "units", and might be "individuals, informal groups, organizations, and/or subsystems" [202].

According to Rogers, diffusion theories go back as far as Gabriel Tarde in the 1900s, who examined legal cases and developed his "laws of imitation" [15]. Since then, various diffusion research traditions have emerged.

Rogers' own DoI sprang chiefly from the rural sociological work of Bryce Ryan and Neal C. Gross, who studied and attempted to explain the uptake of hybrid seeds by farmers across Iowa [15]. Similar work had been performed by Menzel and Katz who investigated "the spread of an antibiotic drug (tetracycline) among medical doctors" [15]. From there, Rogers worked towards a general theory of any new innovation within any social system.

Surry [203] argues that DoI is not so much a single theory as a collection of theories from a wide range of disciplines. Be that as it may, it has been successfully applied in studying the adoption of new technologies (often computer technology) across a wide range of fields, including health [50; 204], Library and Information Science [205], and instructional technology [203].

## 3.9 Diffusion of Innovation elements in more detail

The four elements of the diffusion process mentioned above are core to understanding DoI, and there is value to be gained from examining them in more detail. The examination given here is based almost exclusively on Rogers' *Diffusion of Innovations* [15] and work by Rogers and KL Scott [202].

### 3.9.1 The innovation

An innovation is defined as "an idea, practice, or object that is perceived as new by an individual or other unit of adoption" [202]. There are five characteristics of the innovation that determine its rate of adoption [15]. These are:

- *Relative advantage*. This is the extent to which the new innovation is perceived as advantageous over the old method. Although this can be measured in terms of economy, other areas such as prestige, convenience and satisfaction are important. The crucial point is the extent to which these are perceived to be associated with the innovation.

- *Compatibility*. This is the extent to which the new innovation is compatible with the current norms and practices of the individual. The fewer changes the individual has to make to accommodate the new innovation, the more swiftly the innovation will be diffused.
- *Complexity*. This is the measurement of effort required to understand and use the new innovation; the greater the effort, the slower the diffusion. This is especially important if the individual has to acquire new skills in order to use the new innovation.
- *Trialability*. This is the extent to which the individual can experiment or "play" with the new innovation; the greater the allowance for this, the greater the comfort of the individual with the new innovation, and the easier the diffusion.
- *Observability*. This is the extent to which individuals can see the value of the innovation in others. The greater advantage witnessed, the easier the diffusion.



### 3.9.2 The communication channels

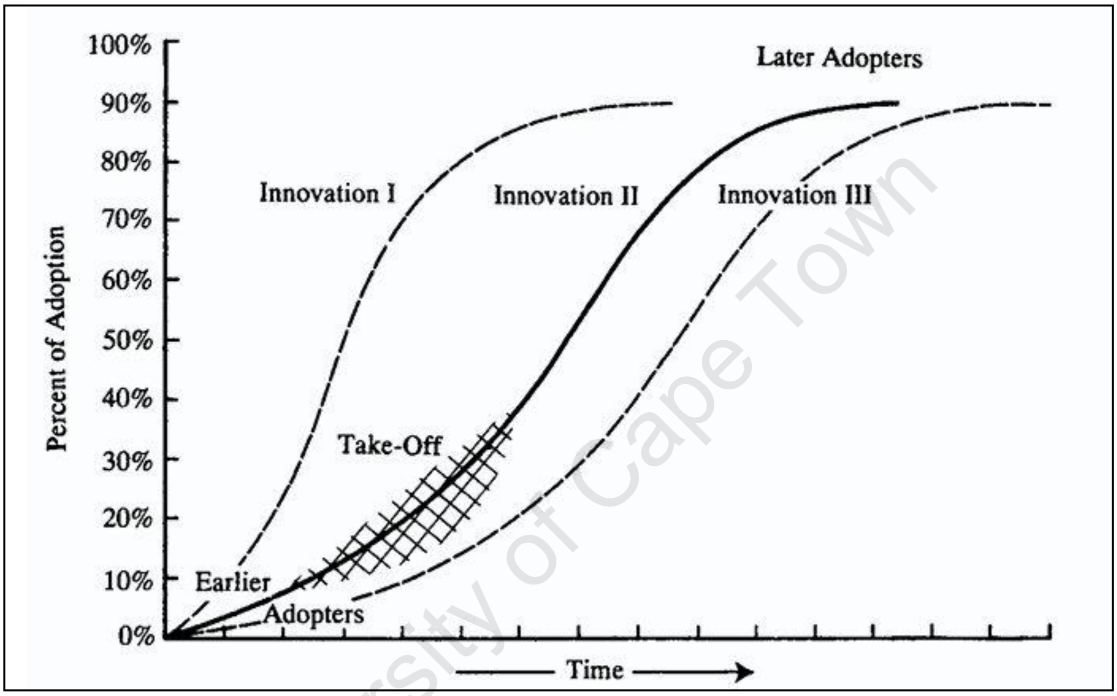
These are the channels through which communication about the new innovation occurs. The channels might be the mass media, or communication with peers who are also in a position to take advantage of the new innovation.

### 3.9.3 Time

Time has bearing on the adoption of the new innovation in three ways:

- *Innovation-decision process*: this is the time taken for the individuals' thought processes to move from first awareness of the innovation to a decision to adopt the innovation. This process of accumulating new adopters is shown in Rogers' work as an S-curve [15], as given in Figure 3-8. Figure 3-8 shows a series of innovations, all following the same pattern.

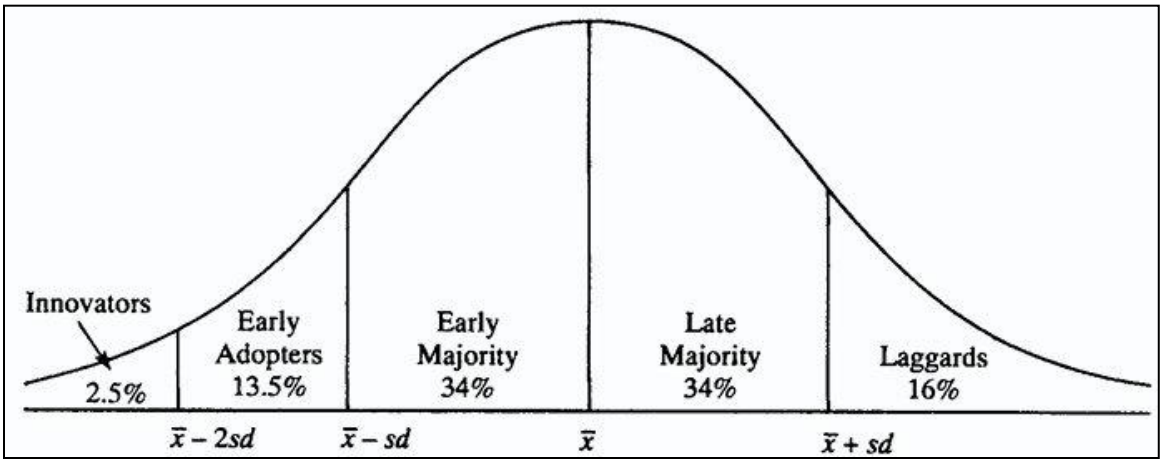
*Figure 3-8: Diffusion process: accumulating new adopters.*






- *Innovativeness*: this is the relative position of the individual decision to adopt the innovation, compared to the other individuals in the social group. Rogers has 5 classifications, or "adopter categories" [15], and each classification contains a percentage of the social group. These are: (1) innovators (2.5%); (2) early adopters (13.5%); (3) early majority (34%); (4) late majority (34%); and (5) laggards (16%) [15]. Rogers shows this as a standard distribution curve [15] as depicted in Figure 3-9.

*Figure 3-9: Classifications of population groups based on the time in which the population adopts an innovation.*




- *Rate of adoption*: this is the rate of adoption, given as the number of members who adopt the innovation in a given period of time.

### 3.9.4 The social system and its components

In Section 3.8, I referred to the members of the social system who might be "individuals, informal groups, organizations, and/or subsystems." The social system is the "set of interrelated units that are engaged in joint problem-solving to accomplish a common goal" and forms the boundary "within which an innovation diffuses" [202]. The social system will encompass the norms or accepted behaviour patterns, the process of opinion leadership ("the degree to which an individual is able to influence informally other individuals' attitudes or overt behavior in a desired way with relative frequency"), and change agents. It also includes the types of decision-making processes (i.e. the extent to which they are determined by an individual or by an authority) [202].

Importantly, the social system is altered because of the new innovation. As Rogers argues, “diffusion is a kind of *social change*, defined as the process by which alteration occurs in the structure and function of a social system” [15].

### 3.9.5 Critical mass

The final concept in the Diffusion of Innovations theory is critical mass. Critical mass is the stage of diffusion where enough units of the social system have accepted the innovation for the adoption to become self-sustaining. The critical mass point is not necessarily identical for each innovation, although it appears to occur at approximately 10-20% of usage [15]. Before critical mass, efforts are aimed at the early adopters and innovators who also serve as role models for the others. At the point of critical mass, the innovation is no longer seen as entirely innovative, and is close to the norm. The benefits of adoption are easily observable, and enough units are using the innovation for fears of complexity to be reduced.



## 3.10 Limitations and criticisms of Diffusion of Innovations

This section will examine criticisms of DoI, and will explain the perceived impact on this study, and how the study intends to lessen the impact of the issues raised in the criticism.

### 3.10.1 Applicability to developing countries

There is some debate about how applicable DoI is to developing countries. Minishi-Majanja & Kiplang'it [205] point to the fact that Rogers himself raises this as a problem, saying that issues of equity should rather be examined [15].

In response, one should note that, although much of the theory was developed in industrialised countries, Rogers does examine cases in the developing world. Countries like Peru, Egypt, India, China, Mali and Columbia [15] are studied, and the theory was successfully applied.

Moreover, a closer reading of the concerns of Rogers' critics [15] shows them concerned with the way that DoI has been implemented, rather than the theory itself. Although there is the suggestion that the social impact of the diffusion process should be looked at more closely than is commonly the case, there is nothing in DoI that renders it incompatible with equity, as the examples in India and Kenya demonstrate.

With particular reference to this thesis, while South Africa is regarded as a developing country, this is not an accurate description across the board, as there are vast socio-economic differences within the country. (In fact, in the refined definitions of "Low income," "Lower middle income," "Upper middle income," and "High income," South Africa is placed in the "Upper middle income" group [206; 207].)

A further important consideration is the fact that, within the South African context, this thesis deals with a group of educated professionals, and DoI predicts that innovators and early adopters of innovations tend to be more highly educated than the norm [15; 208]. This suggests that doctors in South Africa would be using the Internet at a rate easily comparable to national averages in developed countries. The validity of this assumption will be tested in this thesis.

### 3.10.2 Applicability to complex social systems

Oettlé & Koelle [209] argue that DoI "worked relatively well in relatively simple social and production contexts (for example, promoting adoption of an improved variety of maize in a relatively homogeneous farming community), but failed to address the problems that manifest in complex socio-agricultural systems" [209].

It is difficult to assess Oettlé & Koelle's use of the term "complex socio-agricultural systems," because they do not draw directly on theories of complex social systems (such as that by Niklaus Luhmann), but appear to be using the term in a very general sense. The closest they come to a description is that "Complex systems demand aware and intelligent managers, who must not only have access to a wide range of information…but must be able to translate and integrate this information into management decisions that will result in sustainable enterprises" [209]. The extent to which the subjects of this study meet this criterion will be assessed in this thesis.

Nevertheless, Rogers does realise that diffusion is aided greatly when the social system consists of similar, or "homophilous" [15] individuals. If anything, this is a strong argument in favour of using Diffusion of Innovations for this study. As noted above, this study is examining a particular professional sub-group, primary care doctors. They more than adequately meet the requirements of homophily, with a common education, membership of professional bodies, and a "mutual subcultural language" [15].

### 3.10.3 Pro-innovation bias

Rogers warns against pro-innovation bias. This is a problem, not so much of the theory, but rather as a result of over-enthusiastic researchers. By this, he means "the implication in diffusion research that an innovation should be diffused and adopted by all members of a social system, that it should be diffused more rapidly, and that the innovation should be neither re-invented nor rejected…The bias leads diffusion researchers to ignore the study of ignorance about innovations, to underemphasize the rejection or discontinuance of innovations, to overlook re-invention…" [15].

Of course, bias in any study is problematic. At this stage, one can state that this study will be at pains to ensure that diffusion or non-diffusion will not be viewed as success or failure, but merely events. For this, the perspective of non-adopters will be discussed in detail (See especially Chapters 7 and 8).

A second guard, as suggested by Rogers, is to study an innovation in the process of diffusion rather than one already diffused [15]. Given what is already known about South Africa's technological position in the world, diffusion of the Internet in South Africa's Primary Care doctor social system is unlikely to be currently completed. Therefore, this is not a "success" model, but rather a system in transition, as advised by Rogers. Data will not be gathered at different points in time, but one will be able to view the degree of diffusion of different aspects of the Internet.

A third guard suggested by Rogers [15] is to try to find reasons behind the diffusion or non-diffusion of the innovation. A survey does not easily cover the "why" behind adoption, and so causality is not easily determined [15]. There is, therefore the danger of confusing causality with correlation between variables in survey results, and of not fully knowing the explanations behind results.

In this study, a need therefore arises for explanatory complement to the descriptive statistics obtained from a survey. This will be covered in more detail below (See Chapter 4).



#### 3.10.4 Source bias

"A source bias is a tendency for diffusion research to side with the change agencies that promote innovations rather than with the individuals who are potential adopters" [15]. In this vein, Rogers speculates on the implications of having the Columbian University drug study sponsored by the American Medical Association (AMA) rather than Pfizer. Essentially, Rogers is concerned about a conflict of interests. As stated in the preliminary material to this thesis, the researcher has no association with any of the companies or products mentioned in this thesis, and all funding was from the University of Cape Town, the Medical Research Council, and personal funds.

The problem does, however, go further than this, especially when considering those people who do not wish for the innovation, the laggards. There may be a tendency for researchers to assume that the fault lies with the people, rather than with the innovation. This will be addressed in the study.

### 3.10.5 Recall problems

Since time is an important area of study, researchers tend to ask participants about the adoption histories, relying on recall, which may be faulty.

To reduce the impact of recalling information, this study relies almost exclusively on data that are current to the participants. Only one question focuses on first adoption, and extends only as far back as 10 years. Two other questions that require recall of previous usage deal with periods of six months and three months prior to the administration of the survey. In this way, the weakness of relying on recall is reduced.

### 3.10.6 The power of prediction

There is some debate about the use of DoI for prediction. Some researchers (for example, Clarke [208] and Kearns [210]), argue that the DoI model is descriptive "at best," and not valuable at predicting outcomes. This is certainly true to a point, because innovation uptake is affected by a range of aspects, and is not a mechanical, deterministic process. For example, the theory cannot predict the sudden appearance of a new innovation that might render the current innovation obsolete overnight.

In order to compensate for perceived weaknesses in predictive ability, some researchers like Bass [211], Talukdar [212] and Dekimpe *et al.* [213] have devised and extended diffusion models in the areas of sales and marketing, with varying degrees of success [213]. As Dekimpe *et al.* point out, "believing that there is an 'average' country or assuming that the home market's behaviour will be replicated elsewhere may ignore important variances likely to be faced by products going global" [213].

Other researchers, however, argue that these extensions are not at all necessary. Gregor [214] sees DoI as an "encompassing" theory, arguing that Rogers' points out that "the theory has both explanatory and predictive components" [214]. Tornatzky & Klein [215] argue that most of the problems of prediction stem from the weak design of the study, with the major failing arising from the fact that the study is conducted as a single snap shot after the innovation has been adopted, not before.

Reference has already been made to the vast socio-economic variance in South Africa. Combining this with the fact that the study is concerned with a single profession, there is grave danger in projecting results into a description of the general population. For this and other reasons to be discussed later, this study will be guarded in its predictions, and will focus on possibilities based on the emerging practices and influencing professional, social and other factors.

Nevertheless, the ability of DoI to predict the current situation in South African Primary Care will be tested in this thesis, and will form the basis on which to comment on DoI.

### 3.10.7 The weaknesses in relation to study

The study design takes cognisance of the possible pitfalls of DoI, and addresses them, ensuring that the strengths of DoI are not undermined. These possible weaknesses will be addressed as the data are gathered and discussed in later chapters.



## 3.11 Theoretical research questions

The preceding chapter dealt with Primary Care in South Africa, and ended with the development of a practical research question. It also, noted, however that a theoretical understanding of the relevant issues was necessary before one could adequately explore and answer that question.

This chapter has presented ASM and DoI, and has argued for their importance in playing this role. There is a need, however, to be certain that they can fulfill this role. This need leads to the theoretical questions. Because of their importance in answering the practical question, they are labelled Research Questions 1 and 2.

***Research Question 1:***

To what extent does Engeström's Activity Systems Model accommodate Internet usage by South African Primary Care doctors?

***Research Question 2:***

To what extent does Everett Rogers' Theory of Diffusion of Innovations predict and explain the Internet usage patterns by South African Primary Care doctors?

The practical applications are then dealt with by answering what is now Research Question number 3, and is repeated here for ease of reference:

***Research Question 3:***

What can be done to ensure that the Internet is used to best serve the needs of South African Primary Care doctors?

## 3.12 Conclusion

This chapter has described Engeström's Activity Systems Model and Rogers' Diffusion of Innovations.

Through ASM, the underlying structures in the context of the doctors' workplace situation, with particular reference to the delivery of Primary Care, were discussed. For the purposes of this study, it is necessary to note the extent to which ASM is applicable to Primary Care in South Africa. This need has led to the formulation of Research Question 1.

In addition, Diffusion of Innovations gave insight into the processes that occur in the adoption of a new technology, and there is a similar need to understand the extent to which DoI is applicable to the adoption of the Internet in South African Primary Care. This need has led to the formulation of Research Question 2.

This chapter ended by repeating Research Question 3 so that the three Research Questions could be easily referenced.

Having established the context, and the issues to be understood, and having posed the Research Questions, this thesis will now describe the methodology of answering these questions.

# Chapter 4: Research Methodology

## 4.1 Introduction

The previous chapters laid out the practical and theoretical contexts of this study, and also developed the three research questions to be answered.

This chapter explains the methodological structure of this study, and the rationale for using these particular approaches. It will begin by discussing the various ways in which DoI has been applied in surveys. This discussion will include the rationale for a qualitative study to follow the survey, and will reference various other studies as examples. I will then discuss the qualitative method known as Grounded Theory.

Once this has been established, the methods to be followed in the three components of this study: the systematic literature review, the survey and the follow-up qualitative work, will be discussed. The chapter ends with an overall diagrammatic depiction of the methodology used in this study.

## 4.2 Application of Rogers' Diffusion of Innovations in Surveys

Studies applying DoI have used a range of approaches, and, frequently, a combination of approaches. This section discusses some of these, and their implications. This is necessary to understand the rationale of the particular design of this study.

### 4.2.1 From description to action and prediction

DoI is frequently applied to data gathered from quantitative surveys, and then used to describe the situation [215]. From there, actions are recommended, and sometimes predictors are identified.

Examples are the work by Chew *et al.* [204] and Minishi *et al*. [205]. Fiona Chew *et al.* [204] studied the use of the Internet by doctors in a metropolitan area in North Eastern USA. This study was in the form of a mail survey, in which questions were constructed specifically to correspond to the Innovation characteristics of DoI. A rigorous analysis was then applied to the data, predictors identified, and from that, areas of future action were noted.

These examples are valuable uses of DoI for descriptive purposes, and they give some insight into future activity. Like all surveys, however, they are constrained by the confines of the survey form (which itself, is based on theory), and the problem is that one cannot know what one has *not* asked. As Kearns argues [210], the survey form essentially selects the criteria beforehand, and is unaware of other variables that might be at play. The impact could be negligible or significant. The weakness, as Kearns notes, is that "we do not even know if these criteria would be mentioned by decision makers if given the chance to do so in an environment uncontaminated by the researcher's own theoretical framework" [210].

Kearns also notes that many variables, such as cost, should be viewed within the related context, in order to understand the relative importance of the variable. In addition, influencing factors may cluster in ways that are not expected by the researcher. These problems will not be immediately obvious from a standard survey form, and will need to be understood.

So, while the approach of using a survey *only* does have merits, it also has shortcomings, making this approach unsuitable for this study.

### 4.2.2 Combining quantitative and qualitative: qualitative first

Recognising that the theory behind the survey might not lead one to have all the necessary questions in the survey, some studies combine qualitative work with quantitative work.

A useful approach is to undertake the qualitative study first. This type of study identifies problems from which the survey questions are formulated; later, the surveys can be analysed through DoI for a more detailed understanding [216-218]. The qualitative method frequently used in this approach is *Grounded Theory*. Grounded Theory will be examined later.

While this approach does reduce the chances of missing important variables, it still does not allow one to assess the rationale behind the data collected from the survey, and so accurate explanations are difficult.

### 4.2.3 Combining quantitative and qualitative: quantitative first

Recognising the value of using qualitative studies to probe results from surveys, other researchers have *followed up* the survey form with qualitative interviews. It is not always clear whether the quantitative results informed the qualitative questions or whether they were designed beforehand. Nevertheless, the attempt is to go beyond the criteria in the questionnaire.

In most studies, only specific targets, based on specific criteria, are selected. For example, in their study on lawyers, Fombad and Moahi [219] chose a lawyer from each of the firms, but the criteria for this selection are not stated. Other studies (e.g. [220; 221]) follow what Rogers calls "Opinion leadership" [15], in which the opinion leaders are chosen for further study.

Gayle Lewis [221] argues reasonably for the selection of opinion leaders only, and against a random sample of the surveyed population. She says:

> A random sample would not have reflected the disproportionate impact of early user or non-user opinion leaders. If opinion leaders influenced other potential adopters, then their positive or negative perceptions of, or their lack of knowledge about the two leadership products, most likely shaped the product dissemination curves (represented by annual units purchased) and may have influenced the magnitude of their peak differences. [221]

This process is certainly in line with Rogers' "Two-step flow model of mass communication [which] suggests that communication messages flow from a source, via mass media channels, to opinion leaders, who in turn pass them on to followers" [202].

It does, however, carry a risk. Rogers himself fears that the concentration on the leaders leads to pro-innovation bias [15], and his recommendation is that, in order to reduce individual blame, one should involve all potential adopters, including rejectors, in understanding the diffusion problem [15].

The prime reason that one should draw participants from all the potential adopters is that one does not know how innovation adoption might arise from groundswell usage, or from other groups of users. In addition, a concentration on the opinion leaders might give insight into *new* innovative approaches, but will tell little about the adoption rates of innovations that have already been taken up by the leaders – while the information will be, or will already have been, passed to the others, there is no knowledge about what others are doing about it. The time scale for diffusion after the initial uptake by the leaders will be determined almost exclusively by those who are not the leaders. To understand some of the future complexities, then, it is imperative to gain insight from groups other than the leaders.

Kearns expresses similar concerns, and he expands his interviews to a wider group [210]. He interviews a 15% random sample of the original participants. The aim here is to "capture the range of possible assumptions and beliefs about the innovations under study while accounting for the heterogeneity of the communities and their managers" [210].

This approach certainly does broaden the scope. The participants in the qualitative study are, however, a random sample of a random sample. In addition, although this figure of 15% is not entirely arbitrary, it does set a numerical restriction on participants that conflicts with most qualitative approaches (including Grounded Theory). Most qualitative research does not aim at randomised sample, but rather relies on some process of saturation, which is essentially continuing with interviews (or focus groups) until no new information is obtained [222-224]. Details on how this is applied are determined by the particular qualitative method chosen for the study (and will be discussed in detail in relation to this study).

Although each of these approaches has merit, they all introduce their own set of problems. An approach, therefore, that removes these problems, should be applied.

The aim is to follow a process that uses a survey to obtain descriptive data and then follows up the survey with a qualitative study aimed at determining explanations for the descriptive data. This will also allow for the raising of issues that were not covered in the survey. Moreover, the qualitative study should cover a range of participants, and the range should be determined by the concerns of the study itself, rather than by some pre-determined limitations. The triangulation of research methods (literature survey, quantitative study and qualitative study) ensures that the size of population in the qualitative study is determined by the principles of Grounded Theory, and that a perception of a minority of voices is off-set by a sound qualitative theoretical framework. Further, it will ensure that conclusions and recommendations are based on descriptions and understanding of the data.

Before this process is examined, it is necessary to look a little more closely at a suitable qualitative approach.

## 4.3 Grounded Theory

The method that appears to be best-suited for explaining social phenomena is one already mentioned: Grounded Theory. Grounded Theory is based on the work of Barney Glaser and Anselm Strauss [225; 226]. As envisaged (and encouraged) by Glaser and Strauss [226], Grounded Theory has been refined and adapted over the years, with some researchers referring to "grounded theory guidelines" [227]. (Because of these changes and its flexibility, Grounded Theory can become confusing to readers when used without explanatory texts, such as those by Auerbach & Silverstein [228] and Charmaz [227]).



### 4.3.1 Overview

Grounded Theory is a qualitative method aimed at *hypothesis generation* rather than quantitative approaches that identify relationships between independent and dependant variables aimed at *hypothesis testing* [228]. It is valuable for examining situations where hypotheses cannot be determined before-hand, usually because so little previous research has been conducted in that area, or the historical or cultural context is so vastly different from previous studies, that questions and hypotheses based on previous research would miss crucial underlying issues and explanations [228].

In contrast with other qualitative methods, it is primarily explanatory rather than descriptive [229]. It does, moreover, develop a theory that is generalisable "insofar as it specifies conditions that are linked through action / interaction with definite consequences" [230].

Grounded Theory has been used in a range of research projects where qualitative data are required. In Health Sciences and Medicine in general, there are many examples, such as physicians' prescription of antibiotics [231], nursing [229], young people's access to health care in rural Zimbabwe [232], victims of child molestation [233], patients' death from AIDS [234], palliative home carers [235], patient recovery after hospital discharge [236], information transfer amongst decision-makers [237] and counsellors' perceptions of clients [238].

### 4.3.2 Methods of data collection

In the Grounded Theory studies, the data are collected from interviews or focus groups, or a combination of both, and, while there is no set formula, there are some guidelines.

There is some dispute amongst researchers on the importance of specific questions. Some describe the importance of getting the questions correct [227]. Others argue that "getting the questions right is not as important as it might seem" [228], because allowing the participants enough space to speak about what is important to them will give valuable input into the research area.

In addition, most of the questions should be broad, open-ended, encouraging the participants to talk in what is called a *narrative interview* [228]. The overall starting question that guides the research is “What’s happening here?” [227; 239]. For example, questions beginning with “Tell me about this,” or “Describe this” are useful [227].

Responses can be probed further with deeper questions in order to get beneath the surface, and answers to previous questions can be revisited. A guiding idea is that the participant, not the interviewer, is the expert of his own experience [228], and it is this information that the researcher is attempting to gather.

The use of focus groups can be problematic, especially in terms of generalisation, logistics, costs, time and effort taken to find the participants [218; 240]. There are, however, advantages, and these include the facility to allow for a free and open expression of opinion, the deeper exploration of issues that are raised, and the richness that might be added to the research by the group dynamic [218; 240; 241]. For this reason, focus groups are used very widely in Health Sciences studies [216; 232; 237; 241-243].

Although there is no set stipulated amount of time or size for a focus group in Grounded Theory, 30 minutes to 2 hours is usually recommended, and focus group sizes range from 4 to 12 participants [218; 237; 240-245].

Similarly, there is no set number of questions for the focus group, although six is a number recommended by some researchers [228], as this gives the researcher enough scope without overwhelming the participants.

### 4.3.3 Processes

The Grounded Theory processes are flexible, but, in essence, follow this pattern:

1. Identify a broad research problem.
2. Perform a rudimentary (or even no) literature review.
3. Formulate questions – open-ended, general, allowing participants to roam.
4. Conduct interviews and focus groups.
5. Code (categorise) responses according to themes – this forms the crux of the data.
6. Develop a theory based on collected data – i.e. ground the theory in the data.
7. Repeat steps 3-5, refining the theory development.

Although this might appear to be a standard qualitative data approach, it is important to note several qualifying points:

- The process usually begins with a *problem*, and not necessarily a *question*. In fact, the researcher "may not know what the right question is until he has finished collecting and analyzing the data" [228].
- The placing and depth of the literature review is problematic [227]. Purists may delay the review until much later, because Grounded Theory does not

wish the investigator to be confined to particular perspectives [226]. There is, however, always some professional and discipline knowledge. In addition, obtaining institutional approval and funding without a detailed literature review (and even a research question) is an extremely difficult, if not impossible, task [227; 246]. Finally, later work on Grounded Theory has argued against not having a literature review at all [227; 247].

- The process of coding responses involves the development of themes and ideas that arise from the participants' responses, in an attempt to define what is actually happening with the data [227]. Unlike quantitative data gathering, codes are not pre-determined, but arise from the interviews [230]. This is often a two-phase process: initial line-by-line coding (sometimes called "open coding" [248]), and then a second phase that sorts, refines and synthesises the codes [227]. As the interviews progress, codes are added, refined, and may be grouped [230]. The grouping is usually referred to as *axial coding* [227].
- Theory development then refines the axial coding, and is achieved through *theoretical coding* which identifies the types of relationships between the codes in order to develop a theory [239].
- The researcher does not complete all the interviews before coding and theory development. Initial coding and theory development occurs early in the data gathering process.
- Later interviews may have (sometimes subtle) shifts in questions, possibly even selection of participants. These interviews are aimed at refining the theories that have been developed. This refined sampling of questions, and even participants, is known as *theoretical sampling* [227], and is aimed at a deeper exploration of the emerging theory.

- This comparison of data to previous data and the developing theory is known as the *constant comparative method* [226] or *constant comparison* [230]. Strikingly different from quantitative methods (and probably disconcerting to those more familiar with quantitative methods), the gathering of data and the development of theory is a simultaneous and iterative process.
- If circumstances permit, a return to original interview subjects is useful in refining the theory. A variation is to perform interviews of focus groups over an extended period of time so that evolving theories can be tested [230].
- The process ends at saturation. Saturation, however, is not merely that no new data are forthcoming; rather, in the particular theories that are being tested, no new data on those theories are forthcoming. The point at which this is reached is called *theoretical saturation* [227; 228] or *informational redundancy* [224].
- Finally, the researcher must be prepared to bring broader sociological issues to bear, and integrate them into the theory [230].



Perhaps one of the most difficult points for quantitative researchers to accept is the issue of sampling. (This is also a frequent stumbling block that researchers face when applying to have their research approved by institutional review boards and ethics' committees [227]). It is crucial to note that, *in Grounded Theory, there is no attempt at constructing a representative sample based on a statistically determined size or pre-determined range of demographic or other variables*. In fact, the entire concept of randomised, representative sampling is viewed with scepticism [228]. The overall logic to the sampling is that the data determine the codes (categories), which determine the emerging theory, which determines the new questions and participant sample, and this process stops only when those codes (categories) have been saturated with data.  This is the essence of theoretical sampling.

In this way, the final theory stems from the codes, which, in turn, stem from the data. So the theory, then, is *grounded* in the data, or in the reality [230].  Hence the term *grounded theory*.

So far, this chapter has dealt with various relevant methods, and has discussed Grounded Theory.  The rest of this chapter will detail the approach to be followed in this study.  Broadly, this study consists of three separate but related studies, each of which is discussed in some detail below.  In summary, however, the first study is an international systematic literature review of doctors' use of the Internet.  The second study is a survey of South African GPs.  The third study is the qualitative study involving focus groups and interviews with some of the GPs who participated in the survey.

## 4.4 Systematic Literature Review

### 4.4.1 General

As with all studies, the brief narrative literature review in Chapter 2 has already highlighted some of the central themes, and has also given an indication of the uses of the Internet.  The weakness of that review, however, was noted in that chapter: there is very little knowledge about the *extent* to which these activities occur, and the range of problems that are to be found. In DoI terminology, little is known about the overall diffusion of the technology, or of the barriers to that diffusion.

Previous studies conducted on the use of the Internet by doctors in different contexts (e.g. [25; 28; 249; 250]) have ranged widely in their context, scope and approach. Some have focused on a single university or clinic; others national or international. Most of the said studies involved either a postal or telephonic questionnaire. There is, however, no single agreed-upon format, design or methodology for surveys of Internet usage. Even where studies have been repeated from year to year (e.g. [25; 251-253]), the survey instrument has been changed, making chronological comparisons and trends difficult to determine.

There is a need to conduct the review in such a way that the common themes and ideas are extracted and the data synthesised, thereby resolving any potential conflicts amongst studies. To do this, a systematic review of the pertinent literature was conducted. The review was guided by the principles described in articles by Klassen, Jadad and Moher [254-256].



### 4.4.2 The question

The question to be answered by the review was: for what reasons do doctors use the Internet? Behind that question are two sub-questions: (1) what are the activities performed by doctors on the Internet, and (2) what are the factors that encourage and discourage doctors' use of the Internet? At this point it should be noted that these are the questions for the systematic review, following the standard systematic literature review processes [254-256]. They *are not* the research questions of this thesis, but are questions that need to be answered so that the research questions, especially Research Question 2, can be answered.

### 4.4.3 Inclusion and exclusion criteria

Inclusion and exclusion criteria for studies were established beforehand in a protocol. Studies would be included if they were surveys of doctors in any country, examining their use of the Internet, including email, dealing with the main question or its sub-questions, published from January 1994 to November 2004.

1994 was chosen because of the WWW conference, and also because studies earlier than 1994 would give references no longer relevant to the current technology. November 2004 was chosen as the cut-off date, because the search process was conducted in early December 2004, and the development of the survey instrument would depend on the results of the review. Although the cut-off date is a requirement for the conducting of the review and the preparation of the survey instrument, it was recognised that, by the time the results of the SA survey would be ready, the results of the literature review might be out of date. For this reason, the data from the literature would need to be presented in two parts:

- Part 1 would present the data found between 1994 and November 2004. These data need to be presented separately so that the rationale behind the construction of the survey instrument can be verified.

- Part 2 would present data collect after December 2004. These data would be needed to determine if significant changes had occurred between the time of the initial review, and the time of the presentation of the SA study. These data are presented separately (Section 4.5.3).

Either both of the sub-questions had to be examined, or at least one in detail. The search was limited to studies published in English.

To reduce bias, the following types of studies were also excluded: studies of power users only, or users of a particular site, or of one aspect only (such as Evidence-Based Medicine), and studies that were analyses of other broad surveys such as the AMA Studies of Physicians' use of the Web. An exception to the one aspect of exclusion was the study of email. In addition, because the broad studies were large and comprehensive, the original studies would be obtained.



### 4.4.4 Search strategy

The following search strategy was conducted from December 9 - 13, 2004:

- Through EBSCOHost: Academic Search Premier, MEDLINE, ERIC, Health Source - Consumer Edition, Clinical Pharmacology, American Humanities Index;
- Independently: PubMed, Web of Science, Medscape, MD Consult, African HealthLine, MagNet.

The broad range of databases was chosen because surveys of this type might be referenced in non-academic databases. African HealthLine was included because the database might have African surveys not published in American or European journals.

The search terms were: ("Internet" OR "World Wide Web" OR "WWW" OR "email" OR "e-mail") AND ("health" or "doctor" or "physician") AND ("survey" OR "review"). Early pilot searches on these terms indicated that a large number of results would be returned, as the Internet and email are used so broadly, and the noise / information ratio would be high.

### 4.4.5 Data extraction and study appraisal

The following data were sought: date of study, date of publication, setting and subjects, response rate, method of collection, types and rates of Internet access, specific uses of the Internet, interaction with patients through the Internet, and factors encouraging or discouraging Internet usage.

The data were placed into a Microsoft Excel spreadsheet. Variables were arranged in columns. In some studies, data were given as raw figures; in others, data were expressed as percentages of the respondents. As a result, the missing items were calculated from the given data.

Because of the variability of the survey instruments, data for all variables had not been captured by every study. The results tables in Chapter 5 indicate the number of studies reflecting data for each variable. For numbers of participants involved in each category, the minimum, maximum and median was calculated from the percentages. Overall mean was calculated by expressing the total number of participants involved in an activity as a percentage of the total number of participants whose studies gave data for that activity.

### 4.4.6 Quality of studies

Studies were evaluated according to the criteria in Radulescu *et al.* [257]. As these criteria focus on diseases, slight modifications were made to the criteria:

- Given that reported surveys of physicians usually have a response rate of 50-55% [258; 259], the adequate response rate was taken at 50%.
- The valid and repeatable disease definition was modified to "valid study definition" – for this criterion, the definition and objectives of the study had to be clearly stated.
- Information on non-respondents was enlarged to include a discussion on the extent to which the study could be generalised.
- Observer bias was enlarged to include a declaration of affiliations, grant sources, etc.

### 4.4.7 The use of the results

The results of the review (given in Chapter 5), would serve as background for the second study – the survey of South African General Practitioners.

## 4.5 Survey of South African General Practitioners

### 4.5.1 General

As in all surveys, the construction of the survey instrument is crucial to the success of the survey. For this survey, there were several sources of information. The first was Rogers' Diffusion of Innovations which ensured that the theoretical concerns of adoption, barriers, predictors, etc, were based on a sound theoretical footing. The second source was the results of and questions raised by the literature review. The crucial value of this ensured that the questions are specific to the profession. Simultaneously, input from ASM and Primary Care literature was gathered to complete the input data.

### 4.5.2 General versus specific instruments

In measuring diffusion of technology, there are several general survey instruments that have been developed, such as that by Moore and Benbasat [260]. The problem is that, in order to be widely applicable, many of the questions are very general, and would not suit the purposes of this study, which used more specific questions.

For example, general questions that are based only on DoI "Using a [technology] is completely compatible with my current situation" [260], (which would invariably lead to an affirmative answer), were rephrased so that inconsistencies and patterns can be more easily revealed. In addition, rather than asking participants for the *number of* *websites* visited, a list of possibilities was constructed, and participants selected those visited. The list of possibilities was determined primarily from the literature survey.

Rogers, himself, generally discourages the approach of using widely applicable survey instruments "in favour of creating a new scale of items for each set of innovations to be adopted by a particular set of individuals" [15]. One of the advantages is that the emphasis can be moved from the innovative technology to the social or professional group being studied. As this study is concerned with the impact of the Internet on Primary Care, rather than on the Internet *per se*, this is an important consideration.

The survey was designed to test South African GPs' responses to questions that had been developed from the theory, and those that had been asked of international colleagues. This enabled the situation in South Africa to be placed in the theoretical and international context, thereby going some way to completing the description of global Internet usage amongst doctors.

In a process similar to the evaluation of the literature review results, the survey results were also examined in the light of Rogers' Diffusion of Innovations. The specificity of the questions allowed for a more direct comparison between the results of the survey and the information in the literatures review, and for a more accurate description of South African Primary Care doctors' Internet usage in the world context.

### 4.5.3 Sampling and methodology

The questionnaire was designed, and, after ethics approval from the University of Cape Town's (UCT) Faculty of Health Sciences' Ethics' Committee, the original questionnaire was piloted on four local GPs. Based on their responses and comments, it was modified appropriately, and revised to finally contain 39 items (See Appendices 1-5).

The target population was all General Practitioners practising in South Africa. An ideal sample size, for examination of small sub-groups, was statistically determined to be 1300 (See Appendix 6). In July 2006, optimistically aiming for a 50% return, questionnaires were mailed to 2 600 names drawn from the South African Medical Association's (SAMA) database of GPs. (For a fee, SAMA gives permission to researchers to use its mailing list for such research). SAMA is the largest medical union in South Africa, with more than 17 000 GPs in its database. The mailing list generated by SAMA was a random sample, stratified into 70% metropolitan, 30% non-metropolitan, matching the proportions in the SAMA database. The questionnaire pack included a letter (Appendix 2), brochure (Appendix 3), consent form (Appendix 4), a pre-paid self-addressed envelope, and eligibility of entrance into a draw to win one of three prizes worth approximately $70 each. Respondents were also given a URL through which they could complete the survey online. Financial constraint prevented follow-up postings.

Although the letter emphasised that non-Internet users should also complete the survey, there was a risk that they would not, and that the percentage of users would therefore be skewed. The hypothesis that Internet users would be disproportionately represented amongst the respondents would have to be tested. After the survey, a random group of 50 non-respondents would be selected, and interviewed telephonically on their Internet usage, email with patients, and their reasons for not responding. If this group were statistically consistent with the sample, then this hypothesis could be rejected.

### 4.5.4 Language of the survey

The survey was conducted in English. As most of the medical texts and journals that South African doctors are expected to consult are written in English, and the survey form was written at a level of school-leaving English, this would have a minimal impact on South African doctors' ability to complete the form.

### 4.5.5 Data collection and security

The data were collected and entered into an MS-Excel spreadsheet. Forms submitted online were captured electronically, while those completed on paper were captured manually by the researcher.

Data were arranged in tables and charts for easy comparison with the data in the Literature Review, and also according to the characteristics of Rogers' DoI (Relative advantage, Compatibility, Complexity, and Trialability) [15].

The spreadsheet was password-protected, and then 256-bit encrypted, using the AES encryption algorithm, CFB Cipher Mode. Encrypted backups were created and stored off-site.

## 4.6 Qualitative study

Based on the results of the survey, the qualitative study was then designed.

### 4.6.1 General

Studies by Lewis [221] and Kearns [210] demonstrated how Grounded Theory can be used to delve into the unresolved issues raised by a survey, and give explanations for these unresolved issues. In order to offer explanations for the unresolved issues raised by the survey, a semi-structured interview schedule was developed, and a series of focus groups and interviews were held. The Grounded Theory approach was used to further explore these issues, so that theories regarding the use of the Internet in Primary Care in South Africa could be developed. In contrast to studies that interviewed leaders only [221] or a set sample size [210], this study used Grounded Theory's principles of constant comparison and theoretical sampling to determine the sample size.

In addition to resolving the issues raised in the survey, the study was then able to further generate theories, in the form of models of Internet usages and the processes that affect them. The great advantage of this process is that the theoretical models were grounded in data.

### 4.6.2 Sampling

As discussed before, the participants in the interviews and focus groups were drawn from across the spectrum of participants in the survey. A total of 48 respondents volunteered to participate in the interviews, of which 22 volunteered to participate in the focus groups. More details of the participant demographics are given below.

### 4.6.3 Flowing from the survey to the interviews and focus groups

Although, for convenience sake, the survey was held separately from the qualitative study, and each produced their own results, they are part of the same study. Therefore, the flow from the survey to the qualitative study needed to be smooth and part of a continuous process. The advantages of the continuity became clearer as the study evolved. These were primarily:



### 4.6.4 Administrative and demographic information

Of necessity, time must be taken in any interview or focus group to explain the purpose of the research, the expectations, issues of ethics, consent, etc. In addition, various demographic details (e.g. age, place of practice) are required. Although necessary, gathering this information is time-consuming, and reduces the time available for the content discussions. For these interviews and focus groups, however, the administrative information had already been given in the survey, so the participants needed only to be reminded of the most important points. Similarly, the participants had already supplied their demographic information, and only minor changes needed to be recorded.  This meant that some 10-15 minutes, not otherwise available, could be used for content gathering.

### 4.6.5 Number of questions

For much the same reason, the number of questions put to the participants could be fewer than one might expect.  For example, it was not necessary to ask if they were Internet users, or whether they felt that the use of the Internet had improved their medical practice.  This information was already known from the survey.  As result, the question phrasing reminded the participants of what they had said, and then proceeded directly into asking "What" or "Why."  In addition to discussing their own usage of the Internet, the participants could be probed on usage patterns of their colleagues, based on the data gathered from the survey.



### 4.6.6 Quality of questions

A range of deep question types could be asked.  After analysing the data from the survey, it became apparent that there were specific types of questions that would need to be asked.

The questions could be classified according to their relationship with results in the survey, and according to the degree of specificity of the information required.  These do not relate to the extent to which the questions are open-ended: almost all of the questions are open-ended. The classifications, aims, and examples are given in Table 4-1.

*Table 4-1: Classification, aims, and examples of question used in the interviews and focus groups*

| **Scope / Relationship to survey** | **Directly Related** | **Indirectly Related** |
|---|---|---|
| **Specific**<br><br>Looking for a cause. These questions are usually preceded with "Why" | <u>Aim</u>: to understand specific reasons behind or leading to a specific result.<br><u>Example</u>: You said that you were positive about patients' bringing information from the Internet into the consultation room. Why? | <u>Aims</u>: (1) To re-analyse specific data within a specific social context, and (2) to determine reasons for the meta data from the survey.<br><u>Examples</u>: (1) Given SA's technological context, why do you think this result was returned? (2) Why do you think the response rate to the survey was so low, and why did you respond? |
| **Broad** | <u>Aim</u>: to gain a broad understanding of a specific piece of data.<br><u>Example</u>: How does the Internet improve your practice of medicine? | <u>Aim</u>: To tease out (and not necessarily resolve) underlying issues that appear to have arisen from data.<br><u>Example</u>: Using email with patients: tell me about the issues. |

Appendix 7 lists the questions that were put to the participants. Because of the process of theoretical sampling, allowing participants some freedom to roam in their responses, and also time constraints, not all of the questions were put to all of the participants.

### 4.6.7 Language of the interviews and focus groups

The interviews and focus groups were conducted in English. Reference to the English ability of the doctors has already been made. Although several of the doctors did not have English as their mother tongue, all were able to express themselves competently in English.

### 4.6.8 Presentation of results

Because the study is driven by the needs given in Chapter 2, and by the themes raised in the study, the survey and the focus groups and interviews will not be treated as separate chapters. Rather, the presentation and discussion of results will be guided by the structure of the needs and issues. The results are presented in Chapters 6 and 7.

In addition, there is always a tension when presenting results from qualitative studies regarding the number of quotations from interviews and focus groups to present as supporting a particular argument. If too few quotations are presented, then the supporting material is not obvious; if too many are presented, then the flow of the discussion is severely interrupted. To compromise, in many of the cases, only one or supporting quotations are supplied, but the reader is pointed to Appendix 8 where others are to be found. For ease of reading, Appendix 8 completes the circular referencing by referring back to the section to which the quotations have relevance.

## 4.7 Methodology of the focus groups and interviews

### 4.7.1 Piloting the questions

Before the interviews or focus groups, a 2-hour pilot focus group was held with 3 GPs who were not part of the survey or qualitative study. They were made aware of the results of the survey, so that they would have background information to role-play as participants in the research. The doctors collectively had experience in private practice, public hospitals, academia, rural and urban environments. This pilot focus group had the following format:

- A question was asked by the researcher, and the participants answered as if they were GPs in the research. Although this data would be not be used in the final work, it would allow for a preliminary set of themes to be created before the first focus group and interviews, and the set of themes would be modified as the study progressed [246].
- After they had role-played, they then critiqued the question, gave input on the phrasing, and probed the purpose of the question. The prime purpose of this exercise was to improve the quality of the questions.

This process was not always a clear, two-step process, as sometimes, the purpose of the question was not clear, and had to be clarified before the participants could perform the role-play.

The questions were re-structured based on the critiques. The answers to the questions were typed into a Word document. Preliminary themes were designed, based upon these answers, and coded into NVivo Version 7.

### 4.7.2 Focus groups

Two focus groups, one in Cape Town, and one in Johannesburg, were held. The Cape Town focus group was held before any of the interviews, and the Johannesburg focus group was held before the final three (of a total of 19) interviews.

As mentioned earlier in this chapter, a problem with focus groups is the logistics, and the difficulty of gathering a group of professionals [218]. Similarly, in this study, because of logistical problems and last-minute cancellations, the focus groups were very limited in size. The Cape Town group had only two participants, and the Johannesburg group had five participants. All the participants in the focus groups were male. (The methodological resolution (through theoretical saturation) of possible problems associated with the limitations is described in Sections 4.7.5 and 10.3). Each focus group lasted approximately two hours, the high end of the limit set by the literature.

Because of the requirements of a PhD, the researcher conducted the focus groups himself, and did not use outside facilitators, as is sometimes practised [242].

Participants were remunerated at a nominal rate to cover costs and inconvenience.

### 4.7.3 Interviews

A total of 19 interviews (13 males, 6 females) were held. All except one were held telephonically. Telephonic interviews were preferred by the participants because of the flexibility of their schedules and the difficulty of setting aside an hour for the interview. At least half of the interviews had to be rescheduled after the initial appointment, and more than half were conducted after-hours. The interviews lasted 50-60 minutes, although two were slightly shorter because of the time constraints of the participants.

Further demographic details of the participants are given in the results section. Participants were remunerated at a nominal rate to cover inconvenience.



### 4.7.4 Data security control and extraction

The proceedings of the focus groups and interviewees were recorded electronically. After recording, the proceedings were 256-bit encrypted, using the AES encryption algorithm, CFB Cipher Mode. Encrypted backups were created, and stored off-site.

Interviews and focus groups were transcribed *verbatim* by transcribers, and then checked by the researcher. Preliminary identifying material was not included in the transcripts.

### 4.7.5 Data capture and coding

In the initial open coding phase, themes were created from the data. Grounded Theory’s constant comparison technique was applied throughout, with new data modifying the developing theory, and the axial coding process then led to the development of connections. Through this process, a hierarchy of themes and sub-themes was formed. In addition, through constant comparison, occasionally what initially appeared as a single simple theme turned out to be a more complex collection of sub-themes, and was adjusted to contain the sub-themes.

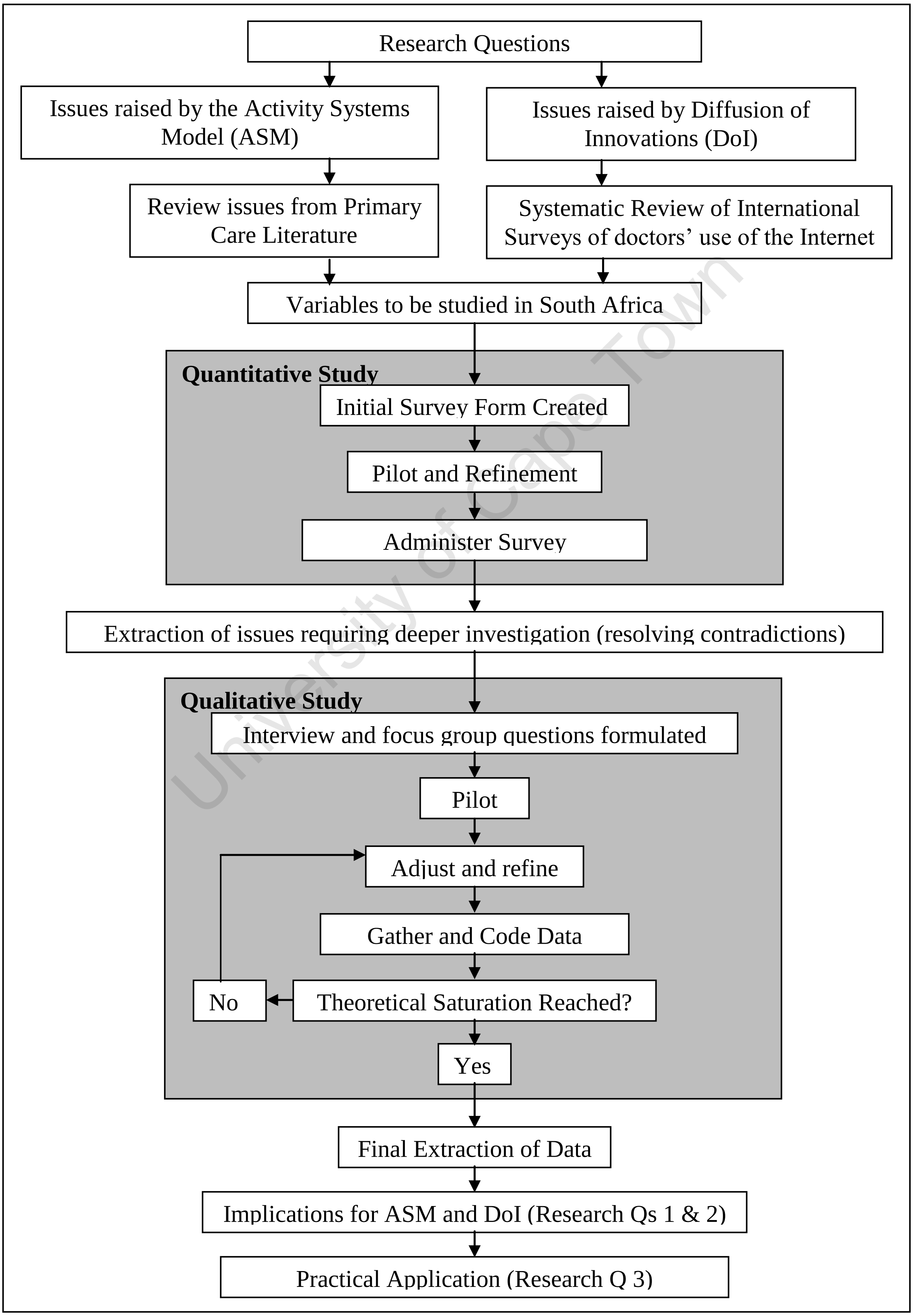
Although the themes were adjusted as data were input, a detailed review of the themes was conducted after the 7th and 14th interview had been coded, and necessary clarifications to questions were made. While the problem of availability for focus groups has been raised, theoretical saturation of the major hypotheses was judged to have been reached after the 17th interview, but two more interviews were held for safety's sake. Because of theoretical saturation, it was not necessary to run any further focus groups or to interview any more volunteers.

The final models (presented in Chapter 8) were the outcome of this process.

## 4.8 An overview of the methodology

Following the various models, the methodology to be followed in this study, was:

*Figure 4-10: Diagrammatical representation of the research methodology in this thesis*



This overview describes a mixed methods approach which approximates the "sequential explanatory strategy" described by Cresswell *et al.* [261] and Adamson [262], in which data from the qualitative study is collected after quantitative study, and is used to explain and interpret much of the data from the quantitative study.

## 4.9 Conclusion

This chapter has commented on the methodologies that have a bearing on this study, and has then outlined the methodological approach of this study. In doing so, it has given details of the data-gathering process, which will move from the systematic literature review to the quantitative survey, to the qualitative gathering of interview and focus group data. In diagrammatic form, it has also shown how the data will lead to the answering of the three research questions.

The next three chapters (Chapters 5, 6 and 7) will give the results of the three studies outlined in this methodology.

# Chapter 5: Results of the Systematic Literature Review

## 5.1 Introduction

The previous chapter explained the rationale for conducting a systematic literature review, and the review methodology. In this chapter, the results of the review are presented and discussed. It will begin with an overview of the data extracted, the sources used, and will evaluate the quality of those sources. It will then move into the meta-analysis of the data, including the identification of the chief correlations of Internet usage based on demographic data.

In the chapters that follow, these data will then provide a global context of usage against which the survey of South African GPs Internet usage is set.

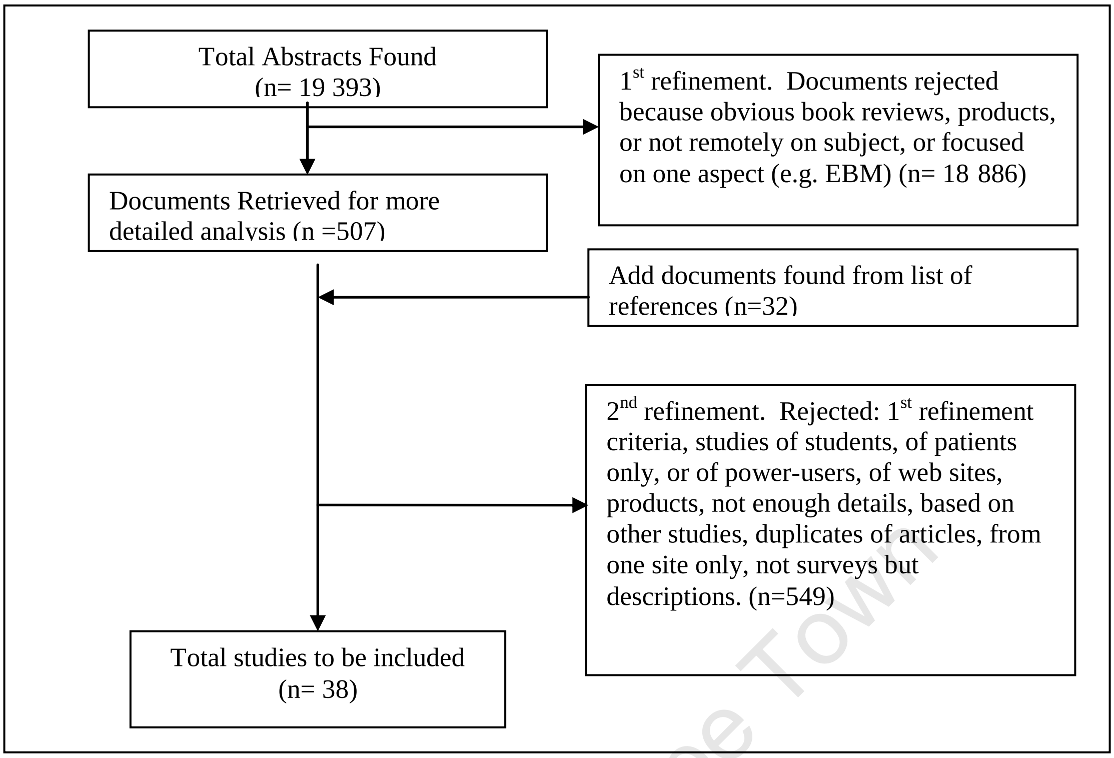
An important function of this review was to develop the survey instrument. Of necessity, then, it focuses on texts published before the construction of the survey instrument. To ensure that the data are current, however, later texts were also tracked, and the data are updated with data from these later texts (Section 5.3).



## 5.2 Systematic literature review

The initial search returned 19 939 abstracts. Further screening was conducted. Figure 5-1 shows the screening refinement process in the path to the final article selection.

*Figure 5-11: Diagram showing path of documentation selection*




36 publications on 38 studies were finally chosen. In the final analysis, because two questions were being addressed, it would have been preferable if all articles had addressed both questions. In reality, however, this would have been very limiting, because often the factors encouraging or discouraging use were not addressed directly. Table 5-1 lists the studies and summary information of each.

*Table 5-1: Studies, showing Author, year of publication, year of study, Respondents' information, Methods*

| **Author** | **Year of Publ.** | **Year of Study** | **Location; Subjects, Full Sample Size / (Eligible) / Respondents. Response Rate.** [1] | **Method** |
|---|---|---|---|---|
| AMA [American Medical Association] [25] | 2002 | 2001 | USA, AMA Physician Masterfile, excluding physicians over 70 and residents. 7 518 / 977 = 13% | Random; Telephone. |
| AMA [25] | 2001 | 2000 | USA, AMA Physician Masterfile. 6 244 / 1 001 = 16% | Random; Telephone |
| AMA [25] | 2000 | 1999 | USA, AMA Physician Masterfile. 15 000 / 1 084 = 7% | Random until 400 interviews with Web user completed; Telephone |
| AMA [25] | 1998 | 1997 | USA, AMA Physician Masterfile. [Total subjects not stated] / 1 950 | Random; Telephone |
| Andrews, *et al.* [28] | 2004 | [Not given] | USA: Primary Care practitioners in Kentucky Ambulatory Network (KAN); 116 / 59 = 51% | Full population; Postal |
| Audet, A-M, *et al.* [249] | 2004 | 2003 | USA, Physicians, 3 598 / 1 837 = 53% | Random / Postal |
| Bell, *et al*. [263] | 2003 | 2001 | USA, Orange County, all primary care paediatric physicians that contract to CalOptima; 307 (offices) / (141) / 140 (offices) = 46% | Full Population; Postal |
| Bennett, *et al.* [26] | 2004 | 2002-3 | USA, Physicians, all specialities as defined by AMA; [Total subjects not stated] / 3 347 = N/A | Random Blocks until 3 200 reached; Fax |
| Carney, *et al.* [29] | 2004 | [Not given] | USA, New Hampshire, Dartmouth Medical School: Preceptors who taught students Sept 1998-April 2001; 178 / 129 = 73% | Full population; Postal |
| Casebeer, *et al*. [59] | 2002 | [Not given] | USA, Physicians of all specialities in active community practice; [Total subjects not stated] / 2 200 = N/A | Random until 2 200 reached; Fax |
| Chew, *et al.* [204] | 2004 | 2002 | USA, All members of AAFP in a north-east metropolitan area; family physicians, 98 / 58 = 59% | Full population; Postal |
| CMA [Canadian Medical Association] [251] | 1998 | 1998 | Canada, all physicians, 7 693 / 3 385 = 44% | Random; Postal |
| CMA [252] | 1999 | 1999 | Canada, all physicians, 7 723 / 3 128 = 41% | Random; Postal |
| CMA [253] | 2000 | 2000 | Canada, all physicians; 8 000 / 2 806 = 35% | Random; Postal |
| CMA [151] | 2001 | 2001 | Canada, all physicians; 7 756 / 3 246 = 42% | Random; Postal |
| CMA [265] | 2002 | 2002 | Canada, all physicians; 7 700 / 2 882 = 34% | Random; Postal |
| CMA [266] | 2003 | 2003 | Canada, all physicians; 7 922 / 2 251 = 28% | Random / Postal |

[1]. Calculated from number of "eligible," (returned uncompleted) participants, if the study makes this distinction. Numbers in italics indicate that respondents were contacted until a specific number had been reached. No indication of the total number contacted

| **Author** | **Year of Publ.** | **Year of Study** | **Location; Subjects, Full Sample Size / (Eligible) / Respondents. Response Rate.** [1] | **Method** |
|---|---|---|---|---|
| Eberhart-Phillips, *et al.* [250] | 2000 | 1998 | New Zealand, all GPs in Otago/Southland region known to Dept of General Practice, Dunedin School of Medicine. 259 / 168 = 65% | Full population; Postal |
| Flanagan, *et al.* [267] | 2003 | 2002 | Germany, France, Sweden, 50% GPs, 50% specialists. [Total subjects not stated] / 606 (254, 251, 101) = N/A | Random; (Telephone?) Interviews |
| Gaster, *et al.* [30] | 2003 | 2000-1 | USA, All physicians in outpatients at U. of Washington and affiliated community-based primary care clinics. 295 / (283) / 249 = 88% | Full population; Postal |
| Given, R, *et al*. [268] | 2002 | 2001 | USA, Practicing physicians; 23 492 / 1 200 = 5.7% | "Representative"; Telephone |
| Gjersvik, *et al.* [269] | 2002 | 2001 | UK, Sweden, Norway: Members of the dermatological societies; 1 291 / 653 = 51% | Full population; Postal |
| Hobbs, *et al.* [270] | 2003 | 2002 | USA, Primary care physicians in Partners HealthCare System, Boston, Massachusetts. 94 / 71 = 76% | Full population; Postal |
| Kalsman and Acosta [271] | 2000 | [Not given] | USA, Rural provider in Wyoming, Montana and Idaho. 481 / 250 (57%) | [selection method not stated]; Postal |
| Kleiner, *et al*. [31] | 2002 | [Not given] | USA, "participating offices", Pediatric physicians (SP & GPs) in their offices; [Total subjects not stated] / 37 = N/A | [selection method not stated]; F2F Interview |
| Koller, *et al.* [272] | 2001 | 2000 | German-speaking Switzerland, 2009 primary care physicians; 2009 / (1103) / = 1085 = 54% | Random; Postal |
| Kwon & Xie [273] | 2003 | [Not given] | USA, physicians and other medical practitioners in the St Louis, Missouri metropolitan area. 1 800 / 445 = 25% | [selection method not stated]; Postal |
| Lacher, *et al.* [274] | 2000 | 1998 | USA, members of American College of Physicians – American Society of Internal Medicine; 45 206 / 9 466 = 21% | Full population; Postal |
| Lorenzo & Mira [275] | 2004 | 2003 | Spain, doctors in clinical units of eight public hospitals. 901 / 302 = 34% | Full population (of selected hospitals); Postal? |
| Miller, *et al*. [276] | 2004 | 2001 | USA, Mostly solo/small group specialist physicians; 23 492 / 1 200 = 5.7% | National stratified random; Telephone |
| Moffat, *et al.* [277] | 2001 | 1999 | UK, (Scotland, Lothian): All GPs in the Lothian Health Primary Care mailing list; 546 / 306 = 56% | Full population; Postal |
| Moyer, *et al.* [278] | 2002 | 1999 | USA, Primary care physicians at two university-based primary-care clinics; 132 / 126 = 95% | Full population; F2F delivery of questionnaire. |
| Murray, *et al*. [279] | 2003 | 2000-1 | USA, National, based on AMA database; 2 000 / 1050 = 53% | Random; Cross-sectional; Postal? |

| Author | Year of Publ. | Year of Study | Location; Subjects, Full Sample Size / (Eligible) / Respondents. Response Rate. [1] | Method |
|---|---|---|---|---|
| Nylenna & Aasland [280] | 2000 | 1998 | Norway, active physicians; 1 646 / 1276 = 78% | Random; Postal |
| Nylenna & Aasland [281] | 2000[2] | 1998 | Norway, active physicians; 1 646 / 1276 = 78% | Random; Postal |
| Poensgen & Larsson [282] | 2001 | [Not certain, poss. 2000] | Sweden and Germany, [Total subjects not stated] / 250 = N/A | [selection method not stated]; Interviews and focus groups |
| Stille, *et al.* [283] | 2003 | 2001 | USA (New England), AAP and / or pediatric generalists and specialists, 900 / (860) / 412 = 45% | Random plus hand-searching Postal |
| von Knoop, *et al.* [284] | 2003 | 2001, 2002 | USA, physicians who spent more than 20 hours per week caring for patients. [Total subjects not stated] / > 400 = N/A | Random; Telephone |
| Wilson [285] | 1999 | [Not given] | UK (Glasgow), GPs; 300 / 160 (54%) | Random; Postal |

In addition, background information on the Canadian Medical Association (CMA) studies was taken from [64; 286-291]

[2] This is a different aspect of the same study as [280]. For meta-analysis purposes, they are taken as one.

### 5.2.1 Quality of studies

As described in the research methodology, the studies were analysed for quality against the criteria in Radulescu *et al.* [257]. Table 5-2 summarises the results.

*Table 5-2: Survey quality Criteria, based on Radulescu, et al. An "X" indicates that the criterion has been met*

| **Author** | **Target Pop** | **Sample Methods** | **Sample Size** | **Response Rate** | **Non-respond / Generalisability** | **Definitions / Objectives** | **Bias / Affiliations** |
|---|---|---|---|---|---|---|---|
| AMA | X | X | | | | X | |
| Andrews, *et al.* | X | | X | X | | X | X |
| Audet, A-M, | X | X | | X | X | X | X |
| Bell, *et al.* | X | X | X | | X | X | X |
| Bennett, *et al.* | X | X | X | | X | X | X |
| Carney, *et al.* | X | | X | X | X | X | X |
| Casebeer, *et al.* | X | X | X | | | X | X |
| Chew, *et al.* | X | | | X | X | X | X |
| CMA (1998) | X | X | X | | | | |
| CMA (1999) | X | X | X | | | | |
| CMA (2000) | X | X | X | | | | |
| CMA (2001) | X | X | X | | | | |
| CMA (2002) | X | X | X | | | | |
| CMA (2003) | X | X | X | | | | |
| E-Phillips, *et al.* | X | X | | X | X | X | X |
| Flanagan, *et al.* | X | X | | | | X | X |
| Gaster, *et al.* | X | X | X | X | X | X | X |
| Given / Miller | X | X | | | X | X | X |
| Gjersvik, *et al.* | X | X | X | X | X | X | X |
| Hobbs, *et al.* | X | | | X | X | X | X |
| Kalsman | X | X | | X | X | X | X |
| Kleiner, *et al.* | | | | | X | X | X |
| Koller, *et al.* | X | X | | X | | X | X |
| Kwon & Xie | X | | | | X | X | X |
| Lacher, *et al.* | X | X | | | X | X | X |
| Lorenzo & Mira | X | X | X | | | X | X |
| Moffat, *et al.* | X | X | | X | X | X | X |
| Moyer, *et al.* | X | | X | X | X | X | X |
| Murray, *et al.* | X | X | X | X | X | X | X |
| Nylenna | X | X | X | X | | X | X |
| Poensgen | X | | | | | X | X |
| Stille, *et al.* | X | X | X | | X | X | X |
| van Knoop, *et al.* | X | X | | | | X | X |
| Wilson | X | X | | X | | X | X |



It is noteworthy that only 3 articles [30; 269; 279] met all the criteria. This does not necessarily mean that the other articles are invalid, but certainly points to a need for an industry standard, as all the criteria, apart from response rate, are easily within the control of researchers.

Most studies that did not have adequate sampling methods had used a convenience sample. These authors, however, pointed out weaknesses and differences between their sample and the general population.

The reason for the lack of information for the CMA articles is that they were published purely as tables of data, with little or no contextual information. All authors of journal articles were careful to point out the aims of the study, and also ensured that bias and authors' affiliations were identified.

### 5.2.2 Representation of countries

Because a global picture is being examined, and because Internet infrastructure varies internationally, the studies were grouped according to the region in which they had been conducted. These results are reflected in Table 5-3. For purposes of context, the percentage of doctors reporting Internet access is also given and compared to the national average percentages as given by the International Telecommunications Union (ITU) [206; 207]. Note that the national averages given are the averages that were accurate at the time of the review (2004), and are used for comparative purposes for studies that existed at the time.

*Table 5.3: Geographical spread of studies, showing country, number of studies, and total number of respondents in those studies, percentage of doctors who had access to the Internet, and the National averages for countries in those studies (2004).*

| **Countries** | **Studies** | **Respondents** | | | | **Doctors Internet (%)** | **National Internet (%)** |
|---|---|---|---|---|---|---|---|
| | | **Total** | **Min** | **Max** | **Median** | | |
| United States | 23 | 26 111 | 37 | 9 466 | 400 | 63 | 55 |
| Canada | 6 | 17 698 | 2 251 | 3 385 | 3 005 | 63 | 51 |
| UK | 2 | 466 | 160 | 306 | 233 | 88 | 42 |
| UK/Sweden/Norway | 1 | 653 | | | | 77 | 42 / 57 / 50 |
| Sweden/Germany | 1 | 250 | | | | 47 | 57 / 41 |
| Germany/France/Sweden | 1 | 606 | | | | 62[3] | 41 / 31 / 57 |
| Norway | 1[4] | 1 276 | | | | 48 | 50 |
| Spain | 1 | 1 302 | | | | 98 | 16 |
| Switzerland | 1 | 1 085 | | | | 75 | 35 |
| New Zealand | 1 | 168 | | | | 72 | 48 |
| **TOTAL** | **38** | **48 615** | | | | | |

Even considering the high Internet penetration in these countries, the number of doctors connected to the Internet appears to be high and, where studies have been repeated, these figures are generally growing. For example, from 2002 to 2003, the percentage of Canadian doctors accessing the Internet from work rose from 48% to 62% [265; 266], and in the USA, the percentage of doctors who used the Internet rose from 42% in 1997 to 82% in 2001 [25]. Given that the review from which these numbers are taken covers 11 years, and that the 2002 Internet penetration for the USA was 55%, and Sweden had the world's highest at 57%, the numbers for doctors are well above the norm.

### 5.2.3 Access to and use of the Internet

On average, some 60-70% of doctors have access to the Internet, although there are several studies [204; 264; 268; 270; 277; 284] that place this figure above 90%. Those studies that were repeated by organisations (such as the American Medical

[3] This is actual users. Those with access is not known.
[4] Two papers, but 1 study

Association (AMA) [25], Canadian Medical Association (CMA) [151; 251-253; 265; 266] and the Boston Consulting Group (BCG) [282; 284]), almost always found an increase in access over time.

On the specific use of the Internet, the studies offered respondents a wide range of activities from which to choose. The results in Table 5-4 show doctors' most common methods of access to and activities on the Internet.

KEY: For the following Tables:

- Studies=number of studies having data for this item
- n=total number of respondents in these studies
- Num=Numerator: total number of respondents involved in this activity in these studies
- %=Numerator/N expressed as a percentage
- Minimum, Maximum and Median of individual studies' percentage

*Table 5-4: Access to and Use of the Internet*

| Categories of Access | Studies | n | Num | % | Min | Max | Median |
|---|---|---|---|---|---|---|---|
| Have Internet access (unspecified) | 32 | 45 821 | 30 599 | 67 | 20 | 100 | 75 |
| Have Internet Access from work | 21 | 24 823 | 16 103 | 65 | 11 | 100 | 72 |
| Have Internet Access from home | 15 | 20 336 | 13 110 | 64 | 24 | 90 | 55 |
| Have email account | 8 | 13 325 | 10 947 | 82 | 60 | 92 | 77 |
| **Activities** | | | | | | | |
| Use Internet (unspecified) | 18 | 23 898 | 15 261 | 64 | 20 | 98 | 69 |
| At least weekly use of the Internet | 10 | 16 844 | 8 650 | 51 | 19 | 75 | 51 |
| Use email to consult with colleagues | 13 | 20 601 | 4 954 | 24 | 13 | 60 | 28 |
| Use email with patients | 15 | 11 581 | 2 536 | 22 | 12 | 72 | 23 |
| **Specific Activities (in order of decreasing number of studies)** | | | | | | | |
| Accessing online journals | 15 | 15 995 | 8 315 | 52 | 13 | 71 | 46 |
| Search for/attend. CME courses/meets | 15 | 20 479 | 6 183 | 30 | 10 | 56 | 31 |
| Professional association updates | 14 | 25 375 | 6 957 | 27 | 12 | 57 | 26 |
| Bibliographic info / Medline | 13 | 19 415 | 9 266 | 48 | 4 | 67 | 37 |
| Drug and dosage information | 9 | 11 904 | 4 441 | 37 | 11 | 66 | 40 |
| Patient Education/Orientation sites | 9 | 13 121 | 3 168 | 24 | 6 | 33 | 22 |
| Getting/Storing Lab Results | 9 | 11 096 | 2 264 | 20 | 3 | 59 | 17 |
| Financial Activities | 7 | 14 193 | 4 786 | 34 | 11 | 45 | 35 |
| Filing Insurance claims | 7 | 8 813 | 1 072 | 12 | 1 | 75 | 9 |
| Travel Information | 6 | 5 760 | 2 235 | 39 | 14 | 67 | 53 |

| Categories of Access | Studies | n | Num | % | Min | Max | Median |
|---|---|---|---|---|---|---|---|
| Literature searching | 4 | 6 997 | 4 874 | 70 | 25 | 89 | 69 |
| Search for Patient-specific information | 4 | 6 934 | 3 044 | 44 | 29 | 63 | 50 |

There is generally a strong and increasing use of active searching in journals and databases, although other activities also frequently feature. Email with colleagues and patients is generally very low, but there is a trend showing an increase over time. Within some studies, however, there was a strong resistance to ever using email with patients (e.g. [28] (42%), [31] (79%), [29]). In many of the studies where email with patients was used, it was generally used with only a small group (e.g. [30]).

On the value of the Internet, a mean of 51% (10 studies, n=6 619) found the Internet useful or extremely useful for finding medical information. In the five studies where more than 50% of the respondents found the Internet useful, 89% had an email account (as opposed to the 82% mean, and 71% for those in studies where less than 50% of the respondents found the Internet useful for finding medical information). Surprisingly, however, in these five studies, Internet access was lower than the mean and lower than the five studies in which the Internet was not found useful or extremely useful: Internet access: 64% vs. 67% vs. 70%; access from work: 58% vs. 65% vs. 76%; access from home: 38% vs. 64% vs. 68%. This point is considered further in Section 5.4.3.1 below.

### 5.2.4 Patients

Apart from interaction with patients via email, the Internet also affects the face-to-face interaction. Increasingly, doctors are reporting patients' bringing Internet material to the consulting room. Eighty nine percent of the doctors reported this, although only a small percentage of their patients are bringing material. To a far lesser extent, doctors are referring patients to Internet sites. The figures for interaction are reflected in Table 5-5.

*Table 5-5: Interaction with Patients*

| Access | Studies | n | Num | % | Min | Max | Median |
|---|---|---|---|---|---|---|---|
| Patients have discussed with doctors material found on the Internet | 9 | 10 169 | 9 045 | 89 | 50 | 98 | 90 |
| Doctors frequently or sometimes refer patients to Web sites[5] | 6 | 11 349 | 2 285 | 20 | 13 | 66 | 25 |

### 5.2.5 Factors discouraging Internet usage



Mention has been made of the variability of the study designs. This variability was particularly evident in the questions regarding the factors discouraging and encouraging usage. Many studies asked all participants, others did not ask at all, and others asked only those who were not using the Internet; some used "Yes / No" options, others used a Likert scale, and others allowed participants to select only the single most important factor discouraging or encouraging usage. The designers' options ranged across at least 38 possible factors discouraging usage and 26 factors encouraging usage.

This summary in Table 5-6 of factors *discouraging* use lists only those factors interrogated by at least three studies. It also distinguishes between answers from all respondents and answers from those not using the Internet.

[5] Includes [279] (n=1 050) where 35% responded, but the frequency is not known

*Table 5-6: Factors Discouraging Internet Usage*

| Factor | All Respondents | | | | | | | Non-users | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **St** | **n** | **Num** | **%** | **Mn** | **Mx** | **Md** | **St** | **n** | **Num** | **%** | **Mn** | **Mx** | **Md** |
| Time[6] | 9 | 4 242 | 2 177 | 51 | 20 | 79 | 45 | 3 | 762 | 555 | 73[7] | 44 | 77 | 73 |
| Workload/effort | 5 | 1 550 | 768 | 50 | 7 | 80 | 53 | 1 | 300 | 45 | 15 | | | |
| Cost | 2 | 2 087 | 963 | 47 | 46 | 47 | 47 | 2 | 761 | 137 | 18 | 16 | 49 | 33 |
| Information: too much / confusing | 3 | 5 797 | 2 443 | 42 | 30 | 57 | 49 | 1 | 614 | 473 | 77 | | | |
| Liability, privacy, confidentiality, security | 7 | 4 128 | 1 490 | 36 | 29 | 79 | 42 | 4 | 1 017 | 143 | 14 | 6 | 48 | 25 |
| Lack of skills or Technical difficulties[8] | 4 | 4 642 | 689 | 15 | 13 | 31 | 17 | 5 | 1 523 | 364 | 24[9] | 1 | 45 | 19 |

Table 5-6 indicates the complexity of the factors *affecting* (encouraging or discouraging) doctors' use of the Internet. Firstly, connectivity is not the most important issue; other issues are at stake. In fact, Kleiner *et al.* [31] show that, while specialists had greater access to email than generalists, 79% of both groups did not wish to use email with patients.

Also mentioned as obstacles were slow download times, navigation difficulties, specific information not available, not being aware of good or valuable sites, lack of reimbursement, no resources, no need, lack of access, software incompatibilities, lost productivity, language barriers, lack of standards, and lack of trust of web sites.

The small number of studies examining each item makes confident statements difficult, but it is obvious that time, workload, cost and too much or confusing information are barriers. Concerns about privacy and liability are primarily in the

6 In 3 other studies (n=9 809) time was listed as a significant factor, but no percentages were given, so data could not be included in this table.
7 In one of these studies, of the 89 non-users, 44% listed it as the "most important" factor
8 Plus one other study in which this was listed as an important factor, but no percentage given.
9 In one of these studies, of the 89 non-users, 9% listed it as the most important factor

area of email with colleagues and patients. Lack of skills plays a role, particularly amongst non-users.

### 5.2.6 Factors encouraging Internet usage

When dealing with factors *encouraging* the use of the Internet and email, survey design consistency was particularly lacking. In 4 studies (n=1 494), however, 94% of physician email users said that it increased patient satisfaction. Other factors were mentioned, but in too few studies to be realistically taken into account. Nevertheless, they are listed here if they were mentioned in two studies where a mean of at least 40% of the doctors who used email with patients, listed these as encouraging factors: improves overall efficiency, delivers better care, enhances medical practice, saves the practice money, assists with time-saving and management, and because of demand from patients. In addition, in two studies, reimbursement was mentioned as a factor that would encourage email communication between doctors and patients.



### 5.2.7 Correlations of usage with demographics

Some studies reported on the relationship between usage and demographic factors. A correlation was accepted if the studies determined one. In the case of the CMA tables, correlations were determined statistically.

Table 5-7 summarises the results where at least three studies gave data on a particular variable.

*Table 5-7: Correlations of Demographics*

| Factor (Less / More) | No or Low Correlations | | Medium or High Correlations | |
|---|---|---|---|---|
| | Studies | n | Studies | n |
| **Gender (F/M)** | 7 | 5 479 | 12 | 34 219 |
| **Age (Old/Young)** | 6 | 2 842 | 15 | 34 790 |
| **Generalist/Specialist** | 5 | 2 713 | 8 | 19 947 |
| **Rural/Urban** | 6[10] | 17 698 | 1 | 2 200 |
| **Practice Size (Small/Large)** | 1 | 71 | 2 | 3 037 |

In addition, however, one study ([25] n=977) indicated a negative correlation on practice size, and another study ([59], n=2200) indicated a negative correlation on Generalists versus Specialists.



Common wisdom, perhaps based on the male/female ratio in Information Technology fields, would lead one to believe that males use the Internet far more than females. While the studies show a slight tendency towards this, it is by no means clear-cut, with 7 studies showing low or no correlation whatsoever. Although one study [280] shows greater usage by males, males and females have equal access. It is true, however, that no studies indicate a significant reverse correlation.

There is also still a strong correlation between age and usage, with the younger doctors using the Internet more. Again, however, 6 of the 21 studies show no correlation. Indeed, the AMA studies [25] show that this difference is decreasing.

## 5.3 Results updated

As already stated, one of the main functions of the literature review was to provide a basis for the development of a survey instrument for South African GPs. As a result,

[10] These are all the Canadian studies.

there had to be a cut-off time after which no further articles could be considered; failure to do so would result in a continuous cycle of data inclusion and questionnaire revision with no final survey.

While this use of a clearly defined systematic review is a strength of the survey instrument, it also leads to a possible weakness in the study. Because the use of the Internet cannot be assumed to be constant, by the time the thesis is released, new data may have altered the view on which the survey instrument was constructed.

Because of this possibility, from 2005 until January 2009, searches for research on the topic continued, and the data were collected. The data from these searches could not be included in the original set of results presented above, because they were not available at the time the survey instrument was being constructed.

The data, however, cannot be ignored. To keep the reader updated, the information regarding these studies is presented here, and the impact on the data presented above is discussed.

Fourteen new articles were found. One article [292] was part of a study already described in the previous literature review [249], and added no new relevant data, so was excluded from the meta-analysis. Three articles [293-295] were all part of the same study, so, for meta-analysis purposes, were taken as one. This resulted in 11 new studies to be included for analysis. Table 5-8 below lists the studies to be included.

*Table 5-8: Studies, showing Author, year of publication, year of study, Respondents' information, Methods*

| **Author** | **Year of Publ.** | **Year of Study** | **Location; Subjects, Full Sample Size / (Eligible) / Respondents. Response Rate.** [11] | **Method** |
|---|---|---|---|---|
| Quijada & Monsanto-Planadeball [296] | 2008 | 2005 | Puerto Rico; 385 doctors from Puerto Rico Department of Health | "Representative sample"; Personal face-to-face Interviews |
| Sim *et al*. [297] | 2008 | 2007 | Australia; all GPs in the Osborne Division of General Practice (ODGP) database, 92 general practices and 396 GPs / 132 = 33.3% | Full population; Postal |
| McCaw *et al*. [298] | 2007 | 2005 | Northern Ireland; all GPs practising in Northern Ireland; 1 081 / 364 = 33.7% | Full population; Postal |
| Menachemi *et al.* [295] | 2007 | 2004 | Florida (USA); primary care physicians and a 25 percent stratified random sample of other specialists; 14 921 / 4 203 = 28.2% | Full population (+25%); Postal |
| Audet *et al*. [292] | 2006[12] | [N.d. post 2003] | USA; AMA physicians in practice at least 3 years post residency; 3 598 / 1 837 = 51%. | Random; Postal |
| Bennett *et al.* [26] | 2006 | 2005 | USA; all specialities as defined by AMA; [Total subjects not stated] / *2 500* = N/A | Random Blocks of 1 000; Fax |
| Brooks & Menachemi [293] | 2006[13] | 2004 | Florida (USA); primary care physicians and a 25 percent stratified random sample of other specialists; 14 921 / 4 203 = 28.2% | Full population (+25%); Postal |
| Guth & Diflo [299] | 2006 | [N.d. given] | USA; American Society of Breast Surgeons; 1 236 / 285 = 23.0% | Full Population; email |
| Liebhaber & Grossman [300] | 2006 | 2004-2005 | USA; AMA and AOA master files at least 20 hours a week in direct patient care. "More than 6,600 physicians" / [est 3432] = 52% | Full population; Telephone |
| Menachemi & Brooks [294] | 2006[13] | 2004 | Florida (USA); primary care physicians and a 25 percent stratified random sample of other specialists; 14 921 / 4 203 = 28.2% | Full population (+25%); Postal |
| Grant *et al*. [301] | 2006 | 2003-2004 | USA; AMA database, physicians in family practice, internal medicine, paediatrics, anesthesiology, general surgery, cardiology 3 167 / 1 662 | Stratified random sample; Postal |

[11]. Calculated from number of "eligible," (returned uncompleted) participants, if the study makes this distinction. Number in italics indicate that respondents were contacted until a specific number had been reached. No indication of the total number contacted

[12] This is a different aspect of Audet, A-M, *et al* [249] presented in the previous literature review. No new relevant data was added, so this was excluded from the meta-analysis.

[13] This is a different aspect of the same study as Menachemi *et al.* [295]. For meta-analysis purposes, the three studies are taken as one.

| Author | Year of Publ. | Year of Study | Location; Subjects, Full Sample Size / (Eligible) / Respondents. Response Rate. [11] | Method |
|---|---|---|---|---|
| | | | = 52.5% | |
| Podichetty *et al*. [302] | 2006 | 2003-2004 | USA; doctors attending CME courses at The Cleveland Clinic, Florida during a 12 month period (September 2003 to September 2004), with at least 20 hours per week on direct patient care. 475 / 285 = 60.0% | Random; Postal? |
| Janes *et al*. [303] | 2005 | 2003 | New Zealand; All North Island rural GPs; 289 / 175 = 60.6% | Cross-sectional; Postal |
| Richards *et al*. [304] | 2005 | 2002 | Scotland; All GPs in 'Inducement [remote] Practices'; 154 / 134 = 87.0% | Full population; Postal |

Of these 11 studies, 6 were from the USA, and 1 each from Australia, the UK, New Zealand, Northern Ireland, and Puerto Rico.

When examining access to and use of the Internet, Table 5-9 below shows the results from Table 5-4 combined with these new studies. Under the headings “Categories of Access” and “Activities” there are increases in Internet usage, Internet access, and email correspondence with colleagues, and a decrease in the use of email with patients. As a balance to the decrease in email usage with patients, however, the study by Liebhaber & Grossman [300], drawing on over 6,600 AMA and AOA doctors, shows a significant increase (from 18% to 24%) in usage amongst these doctors compared to the previous AMA study [25].

For the “Specific Activities,” two extra columns have been added: R1 and R2, each indicating the ranking of the activity. R1 shows the ranking based on the first review only, and R2 shows the ranking after the new 11 studies have been added. The only difference in the ranking is a swop for 6$^{th}$ and 7$^{th}$ place between “Drug and dosage information” and “Financial activities.” All other activities retain their ranking. There is a Spearman Rank Correlation of 0.993 between these two rankings. This indicates that, while specific percentages of doctors’ performing activities may have changed, the impact on the relative positions of these activities is not significant.

*Table 5-9: Access to and Use of the Internet (including the results from later studies)*

| **Categories of Access** | **Studies** | **n** | **Num** | **%** | **Min** | **Max** | **Med** |
|---|---|---|---|---|---|---|---|
| Have Internet access (unspecified) | 39 | 51 499 | 35 964 | 70 | 20 | 100 | 77 |
| Have Internet Access from work | 27 | 30 367 | 20 863 | 69 | 10 | 100 | 69 |
| Have Internet Access from home | 19 | 21 313 | 13 689 | 64 | 14 | 99 | 64 |
| Have email account | 9 | 13 457 | 11068 | 82 | 60 | 99 | 81 |
| **Activities** | | | | | | | |
| Use Internet (unspecified) | 21 | 24 779 | 16 052 | 65 | 20 | 98 | 72 |
| At least weekly use of the Internet | 11 | 17 208 | 8 868 | 52 | 19 | 75 | 54 |
| Use email to consult with colleagues | 18 | 29 715 | 8 387 | 28 | 3 | 64 | 28 |
| Use email with patients | 20 | 21 527 | 4 185 | 19 | 4 | 72 | 19 |

| Categories of Access | Studies | n | Num | % | Min | Max | Med | | |
|---|---|---|---|---|---|---|---|---|---|
| **Specific Activities (in order of activity in Table 5.4)** | | | | | | | | **R 1** | **R 2** |
| Accessing online journals | 17 | 20 157 | 9 851 | 49 | 13 | 71 | 45 | 2 | 2 |
| Search for/attend. CME courses/meets | 19 | 25 311 | 7 137 | 28 | 9 | 81 | 29 | 8 | 8 |
| Professional association updates | 15 | 27875 | 7640 | 27 | 12 | 57 | 27 | 9 | 9 |
| Bibliographic info / Medline | 13 | 19 415 | 9 266 | 48 | 4 | 67 | 37 | 3 | 3 |
| Drug and dosage information | 10 | 14 404 | 4 576 | 32 | 5 | 66 | 36 | 6 | 7 |
| Patient Education/Orientation sites | 9 | 13 121 | 3 168 | 24 | 6 | 33 | 22 | 10 | 10 |
| Getting/Storing Lab Results | 11 | 11 362 | 2 424 | 21 | 3 | 65 | 17 | 11 | 11 |
| Financial Activities | 7 | 14 193 | 4 786 | 34 | 11 | 45 | 35 | 7 | 6 |
| Filing Insurance claims | 7 | 8 813 | 1 072 | 12 | 1 | 75 | 9 | 12 | 12 |
| Travel Information | 6 | 5 760 | 2 235 | 39 | 14 | 67 | 53 | 5 | 5 |
| Literature searching | 5 | 7 382 | 5 162 | 70 | 25 | 81 | 72 | 1 | 1 |
| Search for Patient-specific information | 5 | 9 434 | 3 848 | 41 | 29 | 63 | 50 | 4 | 4 |

Only two studies [298; 302] (n=364 and 285, respectively), queried the doctors on their recommending websites to patients, and patients' bringing material to them. While Podichetty *et al.* [302] reported that 64% of the doctors recommended sites, and 80% had patients bring material to them, McCaw *et al.* [298] reported only 4% and 6% for these figures. These figures indicate not only the range of experiences, but also the possibility of a correlation between these two activities.

The factors that discouraged usage were examined by 3 studies ([26; 298; 299]). There was little impact on the table, with Time (non-users), lack of technical skills, and too much information (users), and liability issues (non-users) being affected. These changes, however, had no statistically significant impact on the table except that liability issues were made slightly more prominent. Table 5-10 below gives an updated version of Table 5-6.

*Table 5-10: Factors Discouraging Internet Usage (including the results from later studies)*

| Factor | All Respondents | | | | | | | Non-users | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | St | n | Num | % | Mn | Mx | Md | St | n | Num | % | Mn | Mx | Md |
| Time[14] | 9 | 4 242 | 2 177 | 51 | 20 | 79 | 45 | 4 | 848 | 613 | 72[15] | 44 | 77 | 70 |
| Workload/effort | 5 | 1 550 | 768 | 50 | 7 | 80 | 53 | 1 | 300 | 45 | 15 | | | |

[14] In 3 other studies (n=9 809) time was listed as a significant factor, but no percentages were given, so data could not be included in this table.
[15] In one of these studies, of the 89 non-users, 44% listed it as the "most important" factor

| Factor | All Respondents | | | | | | | Non-users | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Cost | 2 | 2 087 | 963 | 47 | 46 | 47 | 47 | 2 | 761 | 137 | 18 | 16 | 49 | 33 |
| Information: too much / confusing | 4 | 8 297 | 3 643 | 44 | 30 | 57 | 49 | 1 | 614 | 473 | 77 | | | |
| Liability, privacy, confidentiality, security | 7 | 4 128 | 1 490 | 36 | 29 | 79 | 42 | 5 | 1 226 | 306 | 25 | 6 | 78 | 27 |
| Lack of skills or Technical difficulties[16] | 5 | 7 142 | 1 294 | 18 | 13 | 31 | 17 | 6 | 1 609 | 393 | 24[17] | 1 | 45 | 26 |

There were no detailed examinations of the advantages of Internet usage, although one study [299] examined the advantages of email usage. The facility to answer at one's own discretion, and the ability to provide an organised response were the most highly rated.

When checking the demographic predictors of Internet usage, Table 5-11 below updates Table 5-7.

This table appears to emphasise that the differences in usage across lines of gender are equalising, but differences between ages, urban/rural settings and practice size are not. The differences in these three categories are related almost exclusively to email and email with patients [293-295; 299; 300]. In addition, where some studies show differences, they have differences in some activities only (e.g. [26; 293-295]).

*Table 5-11: Correlations of Demographics (including the results from later studies)*

| Factor (Less / More) | No or Low Correlations | | Medium or High Correlations | |
|---|---|---|---|---|
| | Studies | n | Studies | n |
| **Gender (F/M)** | 11 | 10 484 | 12 | 34 219 |
| **Age (Old/Young)** | 6 | 2 842 | 20 | 44 604 |
| **Gen/Spec** | 5 | 2 713 | 8 | 19 947 |
| **Rural/Urban** | 8[18] | 23 563 | 5 | 10 505 |
| **Practice Size (Small/Large)** | 1 | 71 | 5 | 12 334 |



[16] Plus one other study in which this was listed as an important factor, but no percentage given.
[17] In one of these studies, of the 89 non-users, 9% listed it as the most important factor
[18] Includes the 6 Canadian studies.

In addition to the studies included in the review, other studies have indicated some differences not reflected in this review. These are:

**The rise of electronic-prescribing (e-prescribing).** E-prescribing (or E-RX [305]) was envisaged as a system to "enable transmission of basic prescription data to and from doctors and pharmacists, as well as information about the patient's drug utilization history, possible drug interactions, the drug plan (including information about the formulary and cost-sharing), and information about lower-cost therapeutically appropriate alternatives" [306].

E-prescribing is being spurred on by the promise of greater efficiency, accuracy, and therefore greater patient-benefit in the process of issuing and filling prescriptions [305-311]. While the level of e-prescribing is very small compared to standard prescribing, it is growing rapidly [311], and will need to be examined in future studies.

**Studies from African countries**. Apart from this study, other studies examining doctors' use of the Internet are beginning to appear from African countries [312; 313]. Although these studies did not meet the search criteria to be included in the review, they are the beginning of the process of showing that the value of the Internet to medical practice in Africa is being researched.

In further discussion, where figures from the tables are discussed, figures from both sets of tables will be used.

## 5.4 Discussion

A results chapter does not usually contain a discussion. The structure of this study, however, requires data from the review to be analysed in the light of the theory so that DoI's predictions of Internet usage in South African Primary Care can be generated. These predictions are necessary for the testing of Research Question 2.

As a result, this section is a short discussion of the results, and ends with the predictions of Internet usage in South African Primary Care.



### 5.4.1 Weaknesses of this review

Perhaps the single greatest weakness of this review is the inconsistency in the methods, instruments and terminology used in the surveys. This has been discussed above. A universally-accepted survey form could be extremely useful for future reviews. This would allow for comparisons and trends to be more easily identified.

A second weakness, obvious from Table 5.3, is the geographical inequality of the studies. There is a dominance of North American studies, and, in the first review, all but one of the studies are from the Northern Hemisphere. (In the second review, 9 of the 11 studies are from the Northern Hemisphere). All the countries fall into the group defined by the ITU as "High Income" with an average 2002 Internet penetration of 44.5%. In contrast, in 2002, Africa's figure was 1.2%, with South Africa the highest at 6.8%. By 2004, the High Income countries' Internet usage had increased to 52.5%, Africa's had increased to 2.6%, and South Africa's to 7.9% [314].

By 2005, these figures had increased to 53.9%, 3.7%, and 10.8% [315]. Not a single study was from a developing country. (One might argue the case of Puerto Rico, although it is still classified as a "High Income" territory [315].) For this reason, the mean access cannot be taken as a global picture, but chiefly a picture of the developed world.

### 5.4.2 Uses of the Internet

From Tables 5-4 and 5-9, there is little surprising in the specific activities of doctors on the Internet. Apart from email, they appear to be using the Internet as a large library. Some other activities mentioned in the studies (too few instances to be listed in the results) support this: PubMed, WebMD, Physicians Online, Medscape, MDConsult also feature as popular websites. This pursuit and value of clinical information is borne out by results of other studies of doctors' use of online evidence [316-318], although several studies also indicate that the use of systems such as Cochrane is still low [319; 320].



The high rate of Internet usage amongst doctors compared to their national norms is not entirely surprising, as it is predicted by Rogers' DoI and earlier studies [15] which point to a correlation between education levels and adoption and usage rates of new innovations and technologies.

### 5.4.3 Factors affecting usage

#### 5.4.3.1 Ease of Use

Obviously, connectivity is a pre-requisite for usage, but the usage figures in Tables 5-4, and 5-9 indicate that connectivity does not automatically *lead* to usage. In most of these countries, Internet access is widespread. Yet, as shown in Tables 5-6 and 5-10, the impact of obstacles such as time, workload and effort, cost, confusion, and concerns of liability and confidentiality illustrates that the path to greater and effective use of the Internet is not merely the supply of infrastructure. This is certainly supported by DoI [15; 50; 202-205] which emphasises compatibility, usefulness and complexity as factors affecting adoption of technology; the obstacles mentioned here impact directly on the ease with which the Internet can be integrated into medical practice without disruption, and the degree to which its value can be demonstrated. This is also consistent with barriers identified in other studies of doctors' accessing online materials [321-323].



Although lack of skills features low on the list of barriers (Tables 5-6 and 5-10), in any activity, there is a natural relationship between skills and the effort and time taken to perform a task. It is reasonable to argue that an increase in skills would lead to information being found more easily, thereby reducing the impact of effort and time (and confusion), and perhaps even cost. This appears to be borne out by at least one study ([264]), where 59% of the doctors were confident or very confident in their searching skills and also reported a high level of usage. The impact of skills on doctors' online activities has also been found in other studies [321; 323].

While the results section showed a correlation between perceived usefulness and number of email accounts, there were also five studies that showed a negative correlation between perceived usefulness and Internet access. This may be due to many factors, including a naivety amongst non-users about the value of Internet. Further studies in perceptions of usefulness between users and non-users would be able to clarify this issue.

Accompanying legal and security support will further encourage usage. This is especially true when discussing email interaction with patients. Given that email is the most common activity on the Internet, and that some 82% of the doctors have email accounts, the fact that less than 30% of doctors use it professionally is telling. The importance of legal and security issues has been found in other studies [323; 324], and are also the factors affecting compatibility as determined by DoI.



#### 5.4.3.2 Patient-doctor relationship

The Internet is obviously directly affecting the patient-doctor relationship. The high percentage (89%) of doctors reporting patients' bringing Internet information to the consultation is interesting, especially when compared to the much lower percentage of doctors searching for patient-specific information on the Internet (44%/41%) or referring their patients to web sites (20%). While some of this might be explained by the greater medical expertise of the doctors, it would be useful to ascertain how much is determined by the identified barriers. Nevertheless, patients' use of the Internet is impacting on the relationship, and not always positively, especially when patients attempt some self-medication before consultation [325]. Other researchers, however, have argued that this should be embraced by doctors, as part of the "patient as partner" scenario, and that doctors can use this opportunity to guide patients to web sites and other Internet resources [84; 116; 135; 326-335].

Also encouraging is the fact that, even though the number of doctors searching patient-oriented sites is low (24%), the AMA studies show this to be increasing.

Patient-doctor email interaction affects the relationship, as has been found in other studies [336]. For the most part, it appears that the patients' satisfaction with the medical experience is raised, as is evidenced by the fact that patient-demand is an important factor [59; 284; 336-340] and certainly that some doctors are reporting similar favourable experiences [28; 273; 278; 336; 341]. In fact, a study regarding highly-connected students in Finland, Castrén *et al.* found that email communication between patient and doctors was significantly greater than telephone communication [342]. Finally, as has been found in other disciplines, there is a tendency for email communication to be more frank and direct, particularly in relation to embarrassing topics [343-345].

On the horizon, though, is the problem of reimbursement – it is only logical that, if patients begin to see email communication as a substitute for visiting the doctor, and the doctors' workload increases [346-348], then some form of reimbursement will need to be considered.

DoI notes that compatibility with existing norms and practices is important for a technology to be integrated, and that the obstacles of legality, security and negative impact on the patient-doctor relationship will have to be removed if the Internet is to be effectively used by doctors.

**5.4.3.3 Demographic indicators**

As shown in Tables 5-7 and 5-11, the usage rates between males and females are blurring, and the tendency is towards equalisation. This is consistent with Diffusion of Innovations [15].

The number of studies (Table 5-11) showing the urban doctor using the Internet more than the rural are less than those showing no correlation. It must be noted, however, that six of the eight studies showing no statistical correlation were all from one country, Canada.

An interesting connection exists between generalists and primary physicians as opposed to specialists. There is certainly a greater tendency for specialists to use the Internet more than generalists. On closer inspection, however, this appears less related to the nature of the work, and more related to cost. Cost has already been shown to be a significant factor; as has been shown [249], the start-up costs are great, and this prevents many smaller general practices from going online. Once online, however, the situation begins to change. Gaster *et al*. [30] show that primary care doctors in the same environment as the specialists use the Internet almost as much as the specialists. Further, Casebeer *et al.* [59] show a negative correlation, where specialists have used the Internet for longer than primary care physicians, but the primary care physicians are using it more frequently.

The impact of practice size is unclear – some studies show the larger practices using the Internet more, but others [25] show that, while penetration of usage might be less in solo or two-doctor practices, these doctors spend more time on the Internet than those in group practices; more even than medical school doctors. Similarly, Lorenzo & Mira show doctors in smaller hospitals using the Internet more than doctors in larger hospitals [275].

#### 5.4.3.4 Developing countries

Earlier, attention was drawn to the fact that the studies focused on developed countries. There are, however, insights for developing countries; perhaps the most important of which concerns infrastructure. Infrastructure, in the realm of using electronic communication in health care delivery, applies to more than merely a link to the resource, but at a speed that is appropriate for the user's requirements. In addition, one requires an environment in which individual access to the resource is facilitated [349]. Although infrastructure in developing countries needs to be addressed, efforts aimed at improving infrastructure for Internet access must be accompanied by efforts to overcome the other major obstacles. This is both highlighted by the theory, and demonstrated by the studies in this review. A concentration on infrastructure only will result in delays in doctors' effective use of the Internet.

## 5.5 Implications for this research

In the introduction to this chapter, it was stated that an important reason for conducting this review was to provide input for the development of the survey instrument. An equally important role of this survey, however, was to provide a basis against which to compare South African Primary Care doctors' use of the Internet. This is required to answer Research Question 2 ("To what extent does Everett Rogers' Theory of Diffusion of Innovations predict and explain the Internet usage patterns by South African Primary Care doctors?"). In order to answer that question, it is necessary to know exactly what DoI predicts. Based on Roger's concept of homophily, the South African Primary Care doctors' usage patterns should have the following characteristics:

- Access to and use of the Internet should be significantly higher than the national average.
- The curve of Internet uptake should be predicted by Rogers' graph (Figure 3-8).
- While Internet access is a requirement for Internet usage, there should not be a simple correlation between access and usage, as other factors determine usage.
- Problems of time and workload should be the greatest factors discouraging doctors' use of the Internet. Cost and confusing information and liability issues should also play a role in discouraging usage.
- The most common uses of the Internet should be email, followed by searching for information (especially in online journals).

- Although the percentage of doctors who use email with patients might be high, the percentage of patients with whom those doctors use email should be significantly lower.
- The use of email with patients might be patient-driven, with factors like increased patient satisfaction being a crucial aspect.
- Although the percentage of doctors who report patients' bringing material from the Internet might be high, the percentage of patients who bring information should be significantly lower.
- Correlations between usage patterns might show a general dominance by males over females, and a general dominance of young over old, but this will not always be clear-cut.
- A significant reason for the similarity of usage patterns should be the characteristic of homophily between the South African doctors and doctors in the rest of the world.

While it might be unrealistic to believe that all these predictions will be met in the study of South African Primary Care doctors, at least the majority should be met. In the results and discussion chapters, these and other variables will be referenced in order to answer this question.

Finally, it needs to be noted that these predictions were based on the original literature survey. Although the later studies showed some variations, there was not enough impact of these to alter the predictions.

## 5.6 Conclusion

This chapter has presented the results of a systematic literature review of 38 studies of doctors' use of the Internet since the First WWW conference at CERN in 1994. Each of those studies has contributed information to a larger picture of doctors' Internet usage.

The overall picture that has emerged so far is one of doctors using the Internet far more than their national averages, using email, obtaining professional information from online journals, attending courses and conferences, receiving professional updates and performing professional, administrative functions. Those who have overcome the obstacles, often because of demand from their patients, have found that it has improved overall healthcare delivery. While there are differences of usage between demographic groups, these are not consistent across the studies, and appear to be equalising.



While this review has been able to gather information from developed countries, it has also highlighted the lack of comparable research from developing countries, indicating a need for surveys and similar studies from other parts of the world. With direct relevance to this study, the five study areas identified in Chapter 2 cannot be addressed in relation to South Africa until results from a South African survey are gathered and presented.

Finally, this chapter has presented DoI's predictions of SA doctors' Internet usage. The next two chapters present the results from the survey and the qualitative study, so that the accuracy of these predictions can be tested.

# Chapter 6: Results: Use of the Internet by South African GPs – General Statistics, the Impact of Demographics, and the Five Study Areas

## 6.1 Introduction

Chapter 4 dealt with the methodology of the survey, interviews and focus groups. Chapter 5 presented the results of a systematic literature review. This chapter begins the presentation of the results from the survey and the qualitative study.

It starts by detailing the demographics of the participants in these studies. An examination of the general statistics of usage patterns follows, with the data analysed in relation to demographic data. Primarily, figures that are significantly different between demographic groups will be discussed. In many instances, figures that are unexpected or need further inspection were raised in the qualitative study, and probed more deeply. The results of these findings are also presented.

The chapter then goes on to focus on the five areas of study raised in Chapter 2, concentrating on the results from the qualitative study, and closes with a review of comments dealing with South African GPs usage patterns compared to doctors in the rest of the world.

Some analysis of the quantitative data was needed to guide the contents of the qualitative study, and it is also typical in qualitative studies to have analysis combined with results [223; 224; 228]. This thesis follows a similar pattern, and some of the data analysis is interspersed in the results chapters.

A more detailed analysis and the development of theoretical models is presented in Chapter 8.

## 6.2 Non-responders

Section 4.5.3 describes how, after the survey, 50 non-responders were randomly selected for follow-up. Of these 50, only 14 could be contacted. Only two did not use the Internet, and one used email with patients. None of the 14 contacted could recall receiving the questionnaire, and four said that if they had, they probably would not have completed it because of lack of time. The significance of these results is raised later (Section 10.4).

## 6.3 Overall response rate and validation

From the survey, a total of 394 (15.2%) responses were received. Of these, 107 were returned as undeliverable, and 28 were returned by doctors not working as GPs. These 28 forms were also excluded from the data. Of the 259 (9.98%) valid responses, 19 were received online.

Although 259 is a reasonable absolute number, it is a low response rate, and raises a problem of the sample's representivity. Because of this, the sample's demographic characteristics were compared to those of the SAMA database. Comparisons were made on gender, age, and location. These were chosen because the literature review had identified these as frequently used as possible predictors of Internet usage in the literature.

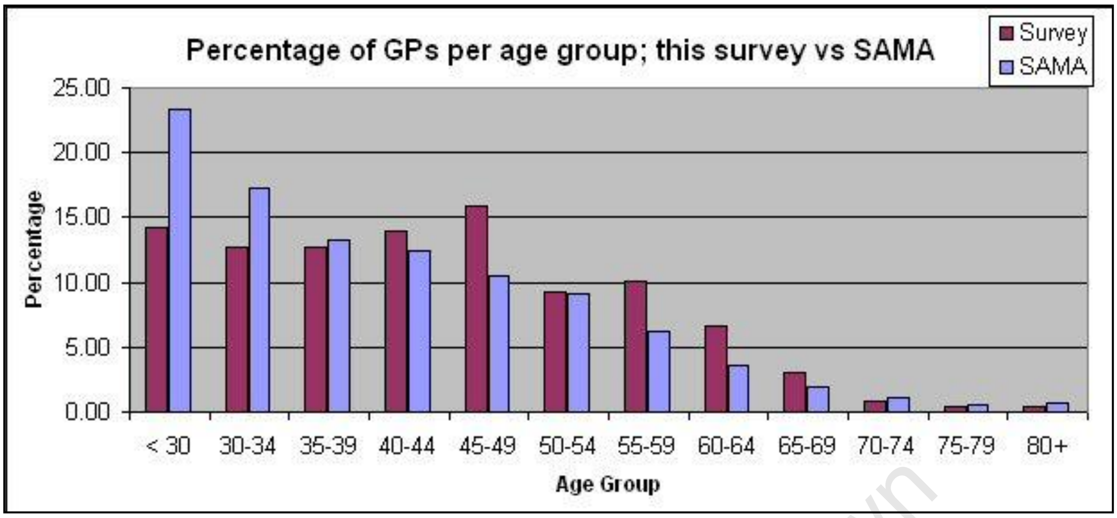
## 6.4 Demographics

### 6.4.1 Survey demographics

Of the survey sample, 68.7% (95% CI: 63.1-74.4) of the GPs were male. The SAMA database has 65.4% male. A $\chi^2$ value of 1.48 (p= 0.2244) was returned indicating no statistical difference between the sample and the SAMA database.

The mean age in the sample was 43.7 (95% CI: 42.3-45.2), and the median was 43, while in the SAMA database, the mean age was 40.5, indicating that the mean age of the sample was statistically significantly higher than the mean age of the SAMA database. For further comparison with the SAMA database, the ages were classified into 12 groups and displayed on a bar chart (Figure 6-1), which shows graphically that the sample has an under-representation in the younger age groups. The reasons and implications of this are explored later in this thesis (Section 10.4.3). For purposes of reporting, the sample was divided into three age groups: < 35 (27.0%); 35-50 (45.2%); >50 (27.8%).

*Figure 6-1: The percentage of respondents in age groups vs. the percentage of GPs in the SAMA database, per age group.*




The sample's geographical location (based on postal codes) was categorised according to SA's nine provinces, and a Spearman Rank Correlation against the SAMA database was 0.937, indicating a very strong correlation of geographic spread across the country.

GPs were classified according to their location (urban, rural, peri-urban) category if they spent at least 50% of their professional time there. 79.2% (95% CI: 74.2-84.1) were urban, 16.2% (95% CI: 11.7-20.7) rural, and 4.6% (95% CI: 2.1-7.2) peri-urban. This compares closely to the 70/30 split of metropolitan and non-metropolitan categories of the SAMA database.

Of the GPs, 158 (61.0%) (95% CI: 55.1-66.9) were in private general practice (PGPs), 60 (23.2%) (95% CI: 18.0-28.3) in public hospitals (HGPs), 18 (7.0%) (95% CI: 3.9-10.0) in public clinics (CGPs), and 23 (8.8%) spread amongst company medical units, academic institutions, and other facilities. Of the PGPs, 70.8% were in practices of two or fewer doctors.

### 6.4.2 Demographics from the qualitative study

As indicated in the previous chapter, a total of 19 doctors participated in the interviews, and seven doctors participated in the focus groups, giving a total of 26 participants.

The demographic details of the qualitative study participants are given in Table 6-1 below.

*Table 6-1: Demographics of qualitative studies' participants*

| Characteristic | Interviews | Focus Groups | Total | Total as % |
|---|---|---|---|---|
| **Gender** | | | | |
| Female | 6 | 0 | 6 | 23.1 |
| Male | 13 | 7 | 20 | 76.9 |
| **Age** | | | | |
| < 35 | 6 | 1 | 7 | 26.9 |
| 35-50 | 8 | 4 | 12 | 46.2 |
| > 50 | 5 | 2 | 7 | 26.9 |
| Mean | 30.4 | 47.0 | 34.9 | |
| **Number of GPs in practice (PGPs only)** | | | | |
| No GPs in Prac: <=2 | 10 | 5 | 15 | 75 |
| No GPs in Prac: >2 | 3 | 2 | 5 | 25 |
| **Sector (at least 50% of time spent as)** | | | | |
| PGP | 11 | 4 | 15 | 57.7 |
| CGP | 3 | 1 | 4 | 15.4 |
| HGP | 5 | 1 | 6 | 23.1 |
| Other | 1 | 1 | 2 | 7.7 |
| **Sector (ANY time spent as)** | | | | |
| PGP | 13 | 6 | 19 | 73.1 |
| CGP | 5 | 2 | 7 | 26.9 |
| HGP | 7 | 2 | 9 | 34.6 |
| Other | 3 | 3 | 6 | 23.1 |
| **Location (at least 50% of time spent in)** | | | | |
| Urban | 15 | 6 | 21 | 80.7 |
| Rural | 2 | 1 | 3 | 11.5 |
| Peri-Urban Settlement | 2 | 0 | 2 | 7.7 |
| **Location (ANY time spent in)** | | | | |
| Urban | 16 | 7 | 23 | 88.5 |
| Rural | 2 | 2 | 4 | 15.4 |
| Peri-Urban Settlement | 4 | 1 | 5 | 19.2 |
| **Number of Years of Internet Usage** | | | | |
| 0 (not a user) | 3 | 0 | 3 | 11.5 |
| 1-5 | 4 | 1 | 5 | 19.2 |
| 6-9 | 8 | 2 | 10 | 38.5 |
| 10 or more | 4 | 4 | 8 | 30.1 |

As has been discussed in detail in the methodology (Section 4.3.3), a fully representative sample is not a criterion in Grounded Theory. Nevertheless, from Table 6-1, one can see that, apart from the shortage of female doctors in the focus groups, a broad spectrum of the GPs was represented in the qualitative study.

Where the qualitative data results are given in the sections to follow, the following key is used:

- [CPTFG]: Cape Town Focus Group and participant number (e.g. [CPTFG-01])
- [JHBFG]: Johannesburg Focus Group and participant number (e.g. [JHBFG-01])
- [Inv] : Interview participant number ([e.g. Inv001])



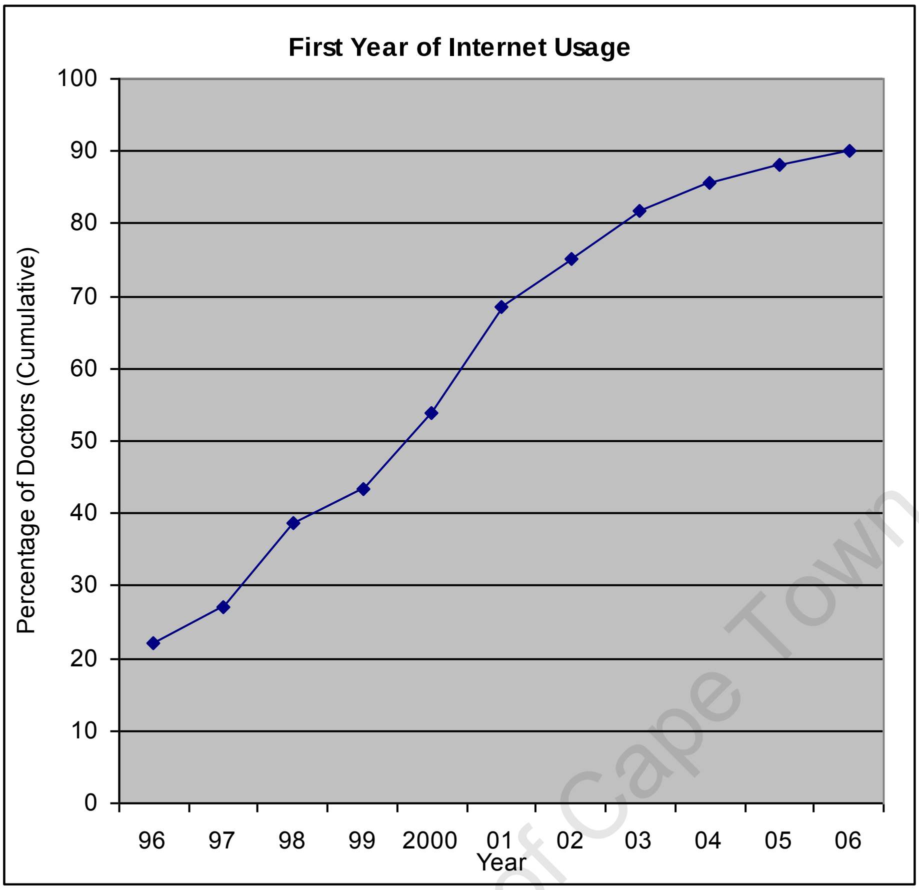
## 6.5 Internet access

Before the five areas of study can be examined, it is necessary to have some idea of the general Internet usage patterns of SA GPs. This section presents summaries of these results, and will then discuss them in the light of the five areas.

### 6.5.1 Overall figures

In total, 231 (89.2%) (95% CI: 85.4-93.0) of the survey sample access the Internet. Doctors were asked for the number of years that they had been using the Internet. To avoid the recall problem identified by Rogers, the questionnaire extended only as far back as 10 years. Figure 6-2 shows the accumulation of Internet users over time.

*Figure 6-2: Percentage of SA GPs using the Internet*






The doctors were asked to identify the location of their Internet access. Of the 231 users, 225 doctors answered the question. Table 6-2 shows the location of Internet access and relative time these doctors spend on the Internet.

*Table 6-2: Place and Percentage of Access*

| Location | % of GPs accessing it from each Location (n=225) | | Relative % of time spent on the Internet (n=225) |
|---|---|---|---|
| | Perc | n | Percentage |
| Home | 82.2 | 185 | 53.1 |
| Clinical Practice | 56.9 | 128 | 32.4 |
| Hospital | 16.9 | 38 | 6.9 |
| Other | 11.6 | 26 | 6.9 |
| Unknown | | | 0.7 |

One of the most striking figures from Table 6-2 is the fact that access from home is high compared to other locations. In addition, the figures for Internet access, access from work and access from home are all statistically greater (P<0.05) than the figures in the International Review. (The category "Other" consisted primarily of access from Internet Cafés and from Academic institutions.)

A possible reason for the high home access was sought in the method of access from work; this is shown in Table 6-3.

*Table 6-3: Method of Internet access at work (n=215)*

| **Activity** | **n** | **%** |
|---|---|---|
| Dial-up (through a 56 Kb modem) | 108 | 50.2 |
| A network connection | 77 | 35.8 |
| Broadband | 40 | 18.6 |
| Laptop (WiFi/GPRS etc) | 33 | 15.4 |
| Other Mobile Device (e.g. PDA, cell phone) | 20 | 9.3 |
| Don't know | 15 | 7.0 |

Of the total doctors, 48 (18.5%) did not have access from work as part of their work environment. Of these 48, however, 4 used personal mobile devices to access the Internet from their work. Of these 44 who did not have access from work, 7 (15.9%) anticipated that they would have access within the next 12 months.

While access from work is high, and growing, Table 6-3 shows that the prime method of access from work is through a 56Kb dialup connection. In SA, where local calls are charged per minute, this is both expensive and inefficient. It is reasonable to expect, then, that this would encourage high access from home.

When examining access for PGPs, this is possibly the case. Of the PGPs who have Internet access at work through 56Kb dialup, 98% have access at home. While this is not statistically significantly higher than the percentage of GPs overall who have access from home (80.9%), it is significantly higher than the percentage of GPs who have access the Internet through other methods at work and also have some form of access from home (57.9%; p=0.04120).

When the total group of doctors was investigated according to their methods of access from work, expected significant differences did not emerge, as is shown in Table 6-4.

*Table 6-4: Place and numbers of access and non-access (n=259)*

| Access Location | Total | Access at Home | |
|---|---|---|---|
| | | n | % |
| **Work Access** | **215** | 164 | 76.3 |
| **Work Access 56Kb only** | **74** | 58 | 78.3 |
| **All Methods excl 56 Kb** | **141** | 106 | 75.2 |
| **Broadband only** | **23** | 20 | 86.9 |
| **No Access at Work** | **44** | 21 | 47.7 |

It appears that, apart from PGPs, the percentage of doctors who have access to the Internet from home does not depend on their method of access from work. Table 6-4, shows that, of those who have access at work through 56Kb dialup, home access is only marginally (and not significantly) higher than those who have access through all methods excluding 56Kb dialup. In fact, although not statistically significant, there is a greater tendency for those with broadband access at work to have access at home. Similarly, there is a tendency for those without access at work to also have no access at home.

Given that (apart from PGPs) it appears that neither lack of access at work nor method of access at work accounts for the high home access, it was necessary to probe this further. In the qualitative study, participants were asked about their location of access, particularly the reasons for the high home access figure, in regard both of their own work, and their colleagues, and GPs in general. The following themes emerged (and will be explored in more detail in the other results):

#### 6.5.1.1 Time

The single most important factor influencing the location of access was time – there is simply not enough time at work to perform the online duties required (whether imposed by an external authority or self-imposed). This appeared across the board, whether doctors were in rural or urban contexts, or private or public practice. Even doctors who did not have Internet access from home believed that time was a major factor.

*The doctor is spending most of his time with patients, face to face with patients, there's no time for the busy doctor to be accessing and communicating, to be accessing the Internet with the patient load, while he is practising. [Inv001] [See also Appendix 8 for more comments]*



#### 6.5.1.2 Lack of access from work

Of the 259 doctors, 44 (17.0%) doctors do not have Internet access from work at all, or it exists, but is not easily accessible.

*I think that purely, I can only really speak from the public sector side of things, because that's where I've worked the most, and work currently, and definitely lack of availability, and there is no access to Internet where I work, and there's never been* *access to Internet in any of the public sector places that I've worked, so, one is forced then to rely on personal Internet access, if one wants to do any form of research on the Internet or communication on the Internet. [Inv019] [See also Appendix 8 for more comments]*

#### 6.5.1.3 The workplace discourages usage

Apart from physical aspects of the workplace discouraging Internet usage, there is far too much control by the workplace administration, and some doctors felt that those in authority at the workplace were sceptical of the use of the Internet for work reasons.

*Because lots of the hospitals don't allow access to the doctors. Like in our hospital we have computers, and some of the administration staff have access to the Internet, but none of our hospital, the clinical staff, have access to the Internet. I don't know whether they don't trust us or what, but we haven't been granted access and I think in most of the hospitals it might be the same way. I don't know whether they are too afraid that people may you know abuse the Internet, to give them, you know, to let them use it but I think that might be one of the reasons. [Inv011] [See also Appendix 8 for more comments]*

### 6.5.2 Internet activities from home

Although the doctors' activities on the Internet are examined later, in the qualitative study, doctors were asked about their Internet activities from home. There was a wide range of both personal and professional use, including personal and professional email, Internet telephony, banking and research:

*I normally get my emails out first, and then I look at my banking status, get on to some of the personal things that I need to do. Some days, I don't say very frequently, but some days, if I have a chance on a specific topic that I tend to know about, I go onto the medical sites. [Inv015] [See also Appendix 8 for more comments]*

### 6.5.3 The demographics of access

The literature review had commented on the statistical variations of activities according to different demographic characteristics. To determine whether there were significant differences along the demographic characteristics in this sample, the data were analysed with multiple tests using the Bonferroni correction, and $\chi^2$ tests. In the analyses below, only figures that show statistical differences between demographic groups ($p<0.05$) are given. While other variations may occur, they are too small to be statistically significant.



#### 6.5.3.1 Age

*Table 6-5: Percentage of access for each age group of GPs (n=225).*

| **Location / Age** | **< 35** | | **35-50** | | **> 50** | | **TOTAL** | |
|---|---|---|---|---|---|---|---|---|
| N | 63 | % | 107 | % | 55 | % | 225 | % |
| Home | 53 | 84.1 | 91 | 85.1 | 41 | 74.6 | 185 | 82.2 |
| Clinical Practice | 29 | 46.0 | 65 | 60.8 | 34 | 61.8 | 128 | 56.9 |
| Hospital | 17 | 27.0 | 16 | 15.0 | 5 | 9.1 | 38 | 16.9 |
| Other | 7 | 11.1 | 15 | 14.0 | 4 | 7.3 | 26 | 11.6 |

The results in Table 6-5 indicate no statistical differences in place of access across the different age groups. While there was no significant difference in the amount of access across the ages, amongst the doctors who did not have access from work, the desire for access was greatest ($p<0.001$) amongst the younger doctors. Of the 48 doctors who do not have access from work, 18 (100%) of the doctors below the age of 35 said they wanted access, while for the age groups 35-50 and 50+, these figures were 9 out of 14 (64.3%) and 6 out of 16 (37.5%) respectively.

The relationship between the three age groupings (< 35; 35-50; > 50), and amount of Internet usage was complex. Of the 259 doctors, a greater percentage of doctors below the age of 50 used the Internet (64/67 (91.4%); 110/117 (94.0%); 57/72 (79.2%)). Table 6-5 also shows that a greater percentage of doctors below 35 used it from hospital (27.0%; 15.0%; 9.1%). The usage data are analysed in a later section.

#### 6.5.3.2 Gender

*Table 6-6: Percentage of access for each gender (n=225).*

| **Location / Gender** | **Male** | | **Female** | | **TOTAL** | |
|---|---|---|---|---|---|---|
| N | 158 | % | 67 | % | 225 | % |
| Home | 129 | 81.7 | 56 | 83.6 | 185 | 82.2 |
| Clinical Practice | 100 | 63.3 | 28 | 41.8 | 128 | 56.9 |
| Hospital | 23 | 14.6 | 15 | 22.4 | 38 | 16.9 |
| Other | 19 | 12.0 | 7 | 10.5 | 26 | 11.6 |

In spite of there being no difference between the percentage of male and female GP Internet users, a greater percentage of males had access to the Internet from work (154/178 (86.5%); 61/81 (75.3%)), and a greater percentage of males had access through 56Kb dialup (47.2%; 29.6%). Table 6-6 also shows that a greater percentage of males than females accessed the Internet from their clinical practice (63.3%; 41.8%), and spent more time accessing it from their clinical practice.

The relative lack of access for females is not personal choice, because amongst the 48 doctors who did not have access from work, the desire for access was greatest ($p<0.01$) amongst the females doctors, where 16/18 (88.9%) wanted access, while only 17/30 (56.7%) of the males wanted access.

#### 6.5.3.3 Location of Work (Urban, Rural, Peri-urban)

*Table 6-7: Percentage of access for each group of GPs (n=225), by location*

| **Location / Role** | **Urban** | | **Rural** | | **Peri-urban** | | **TOTAL** | |
|---|---|---|---|---|---|---|---|---|
| N | 180 | % | 35 | % | 10 | % | 225 | % |
| Home | 146 | 81.1 | 29 | 82.9 | 10 | 100.0 | 185 | 82.2 |
| Clinical Practice | 107 | 59.4 | 16 | 45.7 | 5 | 50.0 | 128 | 56.9 |
| Hospital | 24 | 13.3 | 10 | 28.6 | 4 | 40.0 | 38 | 16.9 |
| Other | 22 | 12.2 | 4 | 11.4 | 0 | 0.0 | 26 | 11.6 |

Because the peri-urban sample was so small (12), and only 10 peri-urban doctors answered this question, it is difficult to determine the statistical significance of the figures showing differences between urban, rural and peri-urban. There were, however, a few non-statistical variations, such as the fact that 100% of the peri-urban doctors who accessed the Internet, did so from home, whereas the mean for the other doctors was 81.4%. In addition, they spent 64.5% of their Internet time from home, whereas the mean for the other doctors was 51.5%.

The reason for high home access from the peri-urban doctors was probed in the qualitative study. It should be noted that there is no clearly accepted definition giving the differences between “urban,” “peri-urban” and “rural” in South Africa [351], or even internationally [352], and frequently the areas of peri-urban and rural become blurred, especially when doctors work in a variety of poorly-serviced areas not in the cities. For this reason, the rural and peri-urban areas are referred to collectively in this thesis as "under-serviced" (See also Section 2.4).

Doctors in the rural areas felt overwhelmed by their range of medical activities and the impact that this had on their time. In addition, general access to the Internet was lacking.

*The facilities are not available in either hospitals or in small clinics or at the GP practices, it's so not so easily available, but at home, one can maintain a computer and the Internet connection much more easily. [Inv007]*

*Remember in the rural areas we do everything, we just don't see patients, I have seen a heart attack today, I've done sutures of the leg, I have, there was a baby born here today as well. This is part of the day-to-day, it's not supposed to happen, but it does happen so that's why I take, whatever I want to do on the computer I do it at home 100% of the time. [Inv002]*

The lack of infrastructure is, of course, not merely an issue of Internet access, but of overall infrastructure:

*They need more help, they're suffering, they need more help. I know, one of my friends was forced to work at a hospital where they didn't even have running water,* *and just when you're stretched to the limits, you grab at every possible resource which you have.  [Inv017]  [See also Appendix 8 for more comments]*

#### 6.5.3.4 Setting (Private General Practice (PGP) vs. Public Hospital (HGP) and Public Clinics (CGP)):

Table 6-8 expands on Table 6-2, showing the access, by setting, from different locations.

*Table 6-8: Percentage of access for each group of GPs (n=225), by location*

| Location / Role | PGPs | | HGPs | | CGPs | | Other | | TOTAL | |
|---|---|---|---|---|---|---|---|---|---|---|
| N | 136 | % | 56 | % | 13 | % | 20 | % | 225 | % |
| Home | 110 | 80.9 | 46 | 82.1 | 11 | 84.6 | 18 | 90.0 | 185 | 82.2 |
| Clinical Practice | 107 | 78.7 | 11 | 19.6 | 0 | 0.0 | 10 | 50.0 | 128 | 56.9 |
| Hospital | 2 | 1.5 | 32 | 57.1 | 3 | 23.1 | 1 | 5.0 | 38 | 16.9 |
| Other | 7 | 5.2 | 9 | 16.1 | 1 | 7.7 | 9 | 45.0 | 26 | 11.6 |



Of the GPs who accessed the Internet, there was no difference in the percentage accessing it from home.  From Table 6-8, however, it is clear that the PGPs access it from their clinical practice more than the other groups.  While Table 6-8 indicates possible differences for Hospital and "Other" access, the sub-groups are too small for statistically significant statements to be made.

Similarly, the CGPs spent far more of their Internet time from home (71.5%) than either the HGPs (59.5%) or the PGPs (49.9.).  HGP accessed it far more from other places (16.1%) than both CGPs (7.7%) and PGPs (5.2%).  On the other hand, the PGPs accessed the Internet 45.9% of the time from their clinical practice.

Again, time and infrastructure were cited as the prime issues preventing access from the clinics:

*When you walk in here there is no place for you to sit, buddy, if you don't have an appointment you have to stand and wait, that's why I have no time to do it during the day. [Inv002]*

Also, because the Internet is used for practice management in private practice, and this is not usually required for the CGPs or HGPs, this reduced the amount of Internet work performed in their place of practice.

*In the hospital, doctors are not using it for the billing and such, not relevant for the doctors who are working in a State hospital, usually they've got a specific department, doctors who are using it billings and accounts. So doctors are basically using it for the management of the patients, looking up Internet information. [Inv007]*



**6.5.3.5 PGPs: Size of practice**

Private General Practices were classified into small (1-2 practitioners) and large (more than 2 practitioners). Larger practices had greater access from work (98.0% vs. 84.3%) and more network connectivity (52.0% vs. 21.5%) and less access through 56Kb dialup (40.0% vs. 57.9%). This was due almost exclusively to the fact that economically, doctors in larger practice could afford the better connections:

*Larger practices, why they have more access to the Internet is, large practices, is because they are larger, more efficient and they tend to have decent infrastructure* *more in place than the smaller single Practice. [JHBFG-01] [See also Appendix 8 for more comments]*

#### 6.5.3.6 Summary

This section on Internet *access* has shown that Internet access is high amongst SA GPs, although home access is significantly higher than access from place of work. In addition, although there *is* access from work for many doctors, this is not across the board, the method of access is generally poor (frequently through 56Kb dialup), and effective usage is prevented by factors such as lack of time and organisational restrictions. The amount of access is not affected by age (although a greater percentage of younger doctors wish for access). Differences in access do exist between gender, location, setting. Finally, doctors in larger practices generally have higher quality access than doctors in smaller practices.



## 6.6 Internet usage

### 6.6.1 General

Of the 231 Internet users, 230 indicated their length of usage: 76.1% had been using it for 5 years or more, 24.4% had been using it for 10 years or more, 51.3% accessed it daily, 33.5% 2-3 times per week, and 7.8% once per week. This figure indicates that 92.6% of the users (or 82.2% of the full sample) use the Internet on a weekly basis. This is far higher than the 51% reported in the literature review.

Unfortunately, from the articles cited in the literature review, there was no indication of the amount of time spent on the Internet per week. As a result, further comparison with the International figures is not possible. Because of the cost of 56Kb dialup, and because half the SA GPs use this to access the Internet, it is possible that the greater frequency does not indicate a greater number of hours of usage.

Table 6-9 shows the number of hours per week spent on the Internet by SA GPs.

*Table 6-9: Total number of hours per week spent on the Internet (n=230)*

| Number of Hours | Percentage of Users |
|---|---|
| 1-4 hours | 48.7 |
| 5-10 hours | 27.0 |
| 11-15 hours | 12.6 |
| 16-20 hours | 6.1 |
| 21 hours or more | 5.7 |

Of the 231 users, 229 indicated whether or not their usage had changed over the past 6 months: 44.1% said that their usage had increased, 52.0% said it had remained the same, and 3.9% said that it had decreased. There were no differences in increase across any of the demographic groupings.

Of the 231 users, 225 gave an indication of the impact of the Internet on their practice of medicine: 74.2% said that it improved or significantly improved their practice of medicine, while 25.3% said it had no impact. Only one GP felt that it had worsened his/her practice of medicine, but no reasons were given, and the doctor declined to be interviewed.

Overall, it is obvious that the Internet is an integral part of doctors' personal and professional life; again emphasised by the large amount of access from home.

The usage figures are also looked in relation to demographics.

### 6.6.2 The demographics of usage

#### 6.6.2.1 Age

While there was a tendency for younger doctors to spend more time on the Internet, this was not a statistically significant figure. A surprising statistic, however, was that on a daily basis, a greater percentage of the doctors over 50 used the Internet (64.9%), than either the 35-50 group (57.3%) or the <35 group (28.6%).

This was probed in the qualitative study. A wide variety of answers was received, but nothing substantial could account for this. Some of the responses are given here:

That the older doctors saw fewer patients, or were less physically active, and so had more time on their hands.

*They have made their money, they have put their kids through school and varsity by now does not need to work that hard anymore and has more time. This guy loves the Internet and he only sees patients from 10 to 12, nothing more, nothing less, that's it. [Inv002]*

Others felt that, because they were less expert on the Internet, they needed to access it more frequently than the younger doctors, in order to accomplish the same types of tasks using the Internet.

*I think there would be [a problem of training], yes, especially probably amongst older people. Younger people tend to be more clued up on the technology. [Inv006]*

In addition, there was the possibility that their medical knowledge had become eroded over time, and they frequently need to look up information.

*No, perhaps they are, their having not been on the cutting edge of academia for a while, they might be more curious and have more questions to ask but not necessary go in-depth. [In010] [See also Appendix 8 for more comments]*

Other answers ventured included the novelty of the Internet, that they were more pedantic about their banking, that younger doctors were less interested in after-hours work, or keeping in touch with their grandchildren.

The amount of uncertainty around the issue might simply mean that it is a statistical oddity. This is discussed later.

**6.6.2.2 Gender**

More males than females had been using the Internet for 10 years or more (30.4%; 11.11%), and 5 years or more (80.4%; 66.7%), and more males also used it on a daily basis (58.9%; 34.7%). In response to the amount of time spent on the Internet (from any location), the median for males was 5-10 hours, while the median for females was

1-4 hours. More males than females said that their use of the Internet had improved or significantly improved their practice of medicine (78.1%; 65.7%).

One striking feature from the survey was the difference between females and males in the amount of time spent accessing the Internet from home. Although an equal percentage of females and males used the Internet from home (83.6%; 81.7%), females spent a significantly greater amount of their Internet time from home than males did (61.9%; 48.0%). While some of this might be driven by the fact that more males than females had Internet access from work, there may be other sociological reasons, and this was probed in the qualitative study. While some doctors were unsure, the most common reason given was that female doctors filled traditional roles at home, and therefore had shorter working hours at work, had to get home to look after families, and so spent more of their time at home on the Internet.

*Once I am at home then my kids want my attention. Once they're into bed around about 9 o'clock, I go back to the computer and do my work or whatever I am busy with. [Inv002] [See also Appendix 8 for more comments]*



#### 6.6.2.3 Location of Work (Urban, Rural, Peri-urban)

For the most part, differences in usage amongst these groups had the pattern of Urban > Rural >= Peri-urban, although, again, because of the small number of users from the peri-urban environment, statistically significant statements could not be made. This exists for percentage of GPs using the Internet on a daily basis (55.7%; 43.2%;

20.0%), although there was a significant difference in the number of hours per week spent on the Internet (7.5 hours; 6.7 hours; 3.9 hours).

This pattern follows the patterns of access from work, and the comments from rural and peri-urban GPs regarding this access. This indicates that, although many of the GPs make up for poor work access by accessing the Internet from home, the access from work still impacts overall on usage.

#### 6.6.2.4 Setting (Private General Practice (PGP) vs. Public Hospital (HGP) and Public Clinics (CGP )

Usage based on setting followed a pattern similar to that of the Location. The only statistically significant difference was found in the numbers of doctors using the Internet on a daily basis: 79/138 (57.3%) PGPs used the Internet on a daily basis, whereas the figures for clinics and Public hospitals were 6/15 (40.0%) and 14/56 (25.0%) respectively.



#### 6.6.2.5 PGPs: Size of practice

The results in the previous section indicated that doctors in larger practices had more sophisticated access than doctors in smaller practices. In spite of this, doctors in the larger practices did not spend significantly more time on the Internet than doctors in smaller practices. This seeming inconsistency was probed in the qualitative study.

The prime reason given was the fact that having a colleague next door meant that there was less need to communicate with other colleagues over the Internet, and less need to research something on the Internet:

*In a larger practice you can pop next door and ask your colleague if you have a query, whereas in a small practice, your nearest colleague may be on the Internet. [Inv013]*

In addition, doctors in small practices need to perform much of their practice management tasks online, whereas in larger practices, these tasks are performed by administrative staff:

*We've got a practice manager who does all of our problems and medical aids and the finance lady does that, so, as doctors we don't have the, the advantage is that we don't have any of the administrative work to do, all the staffing problems, so I suppose that as a doctor you wouldn't, we don't have anything to do with the practice management side of things. [Inv008]*

A possibility ventured was that doctors in larger practices are busier than doctors in smaller practices:

*They are not spending more time than the smaller practices then the reason can be the bigger practices are usually more busy. They are better equipped, but the doctors working there are also more busy than the doctors working in at smaller practices. [Inv007] [See also Appendix 8 for more comments]*

#### 6.6.2.6 Summary

This section on Internet *usage*, then, has shown that Internet usage is high and has been steadily increasing, has followed the S-curve described in DoI, and that it has impacted positively on the practice of medicine. While there were differences in the amount of time spent on the Internet between the different age groups and genders, these were frequently not significant. Females spent more of their Internet access time from home than males did. There were differences of usages based on location and setting, with Urban and PGPs' usage being the greatest. Although usage is dependent upon access, access is not the most significant factor affecting usage, as indicated by the fact that the PGPs in larger practices, although having more and superior access, do not use the Internet more than their colleagues in smaller practices.



## 6.7 Activities on the Internet

### 6.7.1 General

Based on the activities raised in the literature review presented in the previous chapter (Table 5-4), and other activities that had been raised in some of the papers, a list of 26 activities was created. Respondents were asked to indicate whether they use the Internet for any of these activities ("For which of these activities do you use the Internet (indicate all that apply)?"). This question emphasised that it was the activity of the GP personally; so that if an activity was performed in the practice by an administrative staff member, and not by the GP, then it was not included. A total of 231 respondents answered the question, and the results are given in Table 6-10 below.

Although the categories were presented to the participants in random order, the results are grouped here according to the five areas of study. In addition, for ease of comparison with the literature review, percentages are given of the total sample (SA %), the percentages of the first literature review (LR 1) and the combined literature reviews (LR 2). The SA figures and the review figures are compared for statistically significant differences ($p<0.05$), and the p values given; significant p values are in bold. Finally, the rankings of the SA activities (SA (R) ), and the two literature reviews are given. (Rankings are slightly different from those presented in Table 5.4, as Table 6-10 includes email.) Activities not listed in the review are labelled “N/A”.

*Table 6-10: Percentages of SA GPs’ involvement in activities on the Internet, grouped into the five study areas (plus other categories that do not fit).*

| **Activity** | **SA %** | **LR 1 %** | **p 1** | **LR 2 %** | **p 2** | **SA (R)** | **LR 1 (R)** | **LR 2 (R)** |
|---|---|---|---|---|---|---|---|---|
| **The Internet as a source of Information** | | | | | | | | |
| Reading online journals | 54.8 | 52 | 0.3639 | 49 | 0.05679 | 4 | 2 | 2 |
| Searching for Drug Information | 46.0 | 37 | **0.0044** | 32 | < **0.0001** | 5 | 5 | 6 |
| Searching for patient-specific information (diag. assistance) | 43.2 | 44 | 0.8344 | 41 | 0.4279 | 6 | 3 | 3 |
| Attend online CME Courses / Conferences | 24.3 | 30 | **0.0408** | 28 | 0.1679 | 10 | 7 | 7 |
| Collecting Conference Information | 19.3 | | N/A | | N/A | | | |
| Attend online conferences | 4.3 | | N/A | | N/A | | | |
| Telemedicine | 3.5 | | N/A | | N/A | | | |
| **Communicating with Colleagues** | | | | | | | | |
| Visiting Professional Bodies’ Websites | 64.5 | 27 | < **0.0001** | 27 | < **0.0001** | 2 | 8 | 9 |
| Professional email to colleagues | 40.5 | 24 | < **0.0001** | 28 | < **0.0001** | 7 | 9 | 8 |
| Communication with Professional Bodies | 36.3 | | N/A | | N/A | | | |
| Internet Telephone (VoIP) | 10.4 | | N/A | | N/A | | | |
| **Communication with Patients** | | | | | | | | |
| Professional email to patients | 21.2 | 22 | 0.1107 | 19 | 0.4969 | 11 | 11 | 12 |
| **Patient as Partner** | | | | | | | | |
| Looking for sites to recommend to patients | 17.4 | 24 | **0.0115** | 24 | **0.0115** | 13 | 10 | 10 |
| **Practice Management** | | | | | | | | |
| Online banking | 64.5 | | N/A | | N/A | | | |
| Filing medical aid / insurance claims | 34.4 | 12 | < **0.0001** | 12 | < **0.0001** | 8 | 13 | 13 |
| Obtaining / transferring laboratory results | 18.9 | 20 | 0.5575 | 21 | 0.3477 | 12 | 12 | 11 |
| Obtaining / transferring medical records | 6.2 | | N/A | | N/A | | | |
| Filling prescriptions / orders | 5.8 | | N/A | | N/A | | | |

| Activity | SA % | LR 1 % | p 1 | LR 2 % | p 2 | SA (R) | LR 1 (R) | LR 2 (R) |
|---|---|---|---|---|---|---|---|---|
| **Other Professional** | | | | | | | | |
| Teaching | 9.7 | | N/A | | N/A | | | |
| Participating in clinical trials | 8.1 | | N/A | | N/A | | | |
| **Personal** | | | | | | | | |
| Personal email | 86.5 | 82 | 0.0708 | 82 | 0.0708 | 1 | 1 | 1 |
| Entertainment | 53.3 | | N/A | | N/A | | | |
| Personal Purchasing / Shopping | 42.1 | | N/A | | N/A | | | |
| Collecting Financial News | 27.4 | 34 | **0.0332** | 34 | **0.0332** | 9 | 6 | 5 |
| **Other** | | | | | | | | |
| Travel information / arrangements | 58.3 | 39 | < **0.0001** | 39 | < **0.0001** | 3 | 4 | 4 |
| Other | 6.2 | | | | | | | |

Overall, where categories are common to both the review and this study, the usage by SA GPs is generally either the equivalent to or greater than the International level. Exceptions are Financial News (although online banking is high at 64.5%), attending online CME courses (although this changes with the addition of the 2$^{nd}$ review), and looking for sites to recommend to patents. Given that SA GPs are expected to attend CME courses, the low CME attendance online will place a greater burden on them, as they need to travel to attend CME activities. In addition, a Spearman Rank Test was run to compare the ranking of the activities of the SA GPs against those of the reviews. For the first review, the coefficient was 0.709, and for the combined reviews, it was 0.654, in both cases indicating a strong correlation in the rankings between the SA GPs' activities and those of the reviews. Finally, of all the categories, only one category ("Visiting Professional Bodies' Websites") indicates that the South African mean is outside the minimum and maximum range of the International figures.

In addition to activities, the actual websites visited were examined. Based on the websites examined in the literature, and adding other local sites, a list of 29 Websites (plus a "None" and "Other"), was created. A total of 228 respondents answered the question identifying the websites that they had visited in the previous three months.

Table 6-11 shows the responses to this question.

*Table 6-11: Percentages of SA GPs' visiting specific websites within the past 3 months*
*Percentages are given as a percentage of the total sample.*

| Website | Percentage |
|---|---|
| **Medical Association** | |
| SAMA | 33.6 |
| Health Professionals' Council of South Africa (HPCSA) | 32.4 |
| Independent Practice Assoc (IPA) | 10.8 |
| **General Search Engine** | |
| Google (for Searching) | 75.3 |
| Google Scholar | 7.7 |
| Yahoo (for Searching) | 34.0 |
| Another Search Engine | 13.5 |
| **Medical -- Clinical** | |
| Medline | 29.3 |
| PubMed | 26.6 |
| Medscape | 13.5 |
| Physicians Online | 4.3 |
| WebMD | 4.3 |
| MD Consult | 3.9 |
| Other Medical sites | 24.7 |
| **Medical – Non Clinical** | |
| Medical Aid Site | 32.1 |
| Discovery Health[19] | 29.3 |
| A Pharmaceutical Co. | 5.8 |
| **Newspapers and News Stations** | |
| Any online newspaper | 29.0 |
| CNN | 8.5 |
| Other foreign news station | 8.9 |
| MNet[2] | 7.7 |
| SABC[2] | 4.6 |
| ETV[20] | 1.9 |
| **Other Personal Sites** | |
| Your Bank | 61.8 |
| An Airline | 44.8 |
| A travel site | 42.5 |
| Amazon | 23.9 |
| Cell phone / provider | 17.0 |
| Telkom | 12.7 |
| **Other** | |
| Other | 5.0 |
| No Web pages visited | 2.3 |

[19] An SA Medical Aid Site
[20] A local television station

Although Tables 6-10 and 6-11 give figures for the usage of the Internet by the SA GPs, when determining the extent to which the doctors' usage is predicted by DoI, this thesis will view these figures in the context of the predictions made in Section 5.5, and the minimum and maximum figures given in Table 5-4, and the reader should take care to not confine the comparison to these tables only. (It is highly improbable that any country's usage figures would match most of the averages at this level of detail, and, looking for such matches would be looking for a mythical "'average' country" [213]).

### 6.7.2 The demographics of the activities and websites

The activities of the doctors' on the Internet will be examined in more detail in the next sections, in relation to the five study areas. For now, however, a brief overview of the demographic information relating to activities will suffice.

#### 6.7.2.1 Age

When viewed in the three categories, the youngest groups of doctors visited several sites more. This included Medline (42.2%; 35.5%; 18.5%), PubMed (37.5%; 34.6%; 13.0%), WebMD (9.4%; 4.6%; 0%), Google (96.9%; 87.3%; 68.5%), Yahoo (50.0%; 30.9%; 40.7%), and their Bank (78.1%; 72.7%; 55.6%). Although the doctors above the age of 50 used the Internet for fewer activities, there was frequently a blurring between the two lower age groups, especially in the overall activities visited.

In addition, there were many times when the middle age group had the highest usage. These were for Medscape, personal email, professional email to colleagues, online banking, visiting professional bodies' websites, entertainment, searching for patient-specific information, and looking for sites to recommend to patients. Doctors in the oldest group visited Independent Practice Associations (IPAs) more.

#### 6.7.2.2 Gender

Overall, there was little difference in activities between males and females, although males engaged in some Internet activities more than females: medical aid/insurance, financial news, teaching, personal purchasing / shopping and three web sites: IPAs, cell phone provider, and other foreign news stations.

#### 6.7.2.3 Location of work (urban, rural, peri-urban)

The pattern of urban > rural >= peri-urban was seen only in use of email to patients, and participation in clinical trials. There were also other activities in which the peri-urban GPs did not participate at all, but the figures for the other GPs in these activities were too low to draw significant conclusions. These activities included transferring laboratory results, transferring medical records, prescriptions, looking for sites to recommend to patients, and telemedicine.

### 6.7.2.4 Setting (Private General Practice (PGP) vs. Public Hospital (HGP) and Public Clinics (CGP)

The pattern of PGP > HGP >= CGP continued in many of the activities. These were email to patients, filing medical aid and insurance claims, prescriptions, participating in clinical trials, online banking and Discovery Health.

There were, however, a few variations. HGPs had greatest use of the Internet for email to colleagues, and teaching, and they were comparable to PGPs in the use of the Internet for entertainment, and accessing Google. In two instances, the usage patterns of CGPs and HGPs (visits to medical aid sites and IPAs) were reversed. Reverse differences existed for PubMed and Medline, with CGP accessing these sites more than the HGP and PGPs.

### 6.7.2.5 PGPs: size of practice

The only differences in activities based on size of practice were travel information, with doctors in larger practices accessing this more, and filing of medical aid and insurance claims, with these doctors doing this less.

Consistent with these activities, doctors in smaller practices visited Discovery Health, medical aid sites and SAMA more, and also visited travel sites and airlines less.

#### 6.7.2.6 Summary

This section on the SA GPs Internet activities has shown the similarities and differences between their activities and those of their international colleagues. While percentage differences exist, there is overall similarity in activities. Demographically, there was little difference in activities between the genders, and some differences between the age groups, location, and setting.

## 6.8 The five areas of study

While the preceding figures are crucial for our understanding of the SA GPs' use of the Internet in general, much of the argument in this thesis is related to the five specific areas of impact that were raised in Chapter 2, and the way in which they impact on health care delivery in SA.

Much of the empirical data relating to these activities has already been given, and reference will be made to that data. In addition, some reference has been made to these five areas in the discussion of location and amount of access, and particular activities. This section highlights more detailed data, from both the survey and the qualitative study.

To create the overall context, it was necessary to begin with a general sense of how the doctors saw the impact of the Internet on their practice. As seen above, in response to the survey question on the general impact of the Internet on their practice, 74% said that it improved or significantly improved their practice of medicine.

In the qualitative survey, all GPs who had answered "Improve or Significantly Improve" were asked for their reasons. From the themes and sub-themes that arose, all five of this thesis's study areas were raised by the participants. Following grounded theory [226], these themes and sub-themes were then categorised by the researcher.

Similarly, those participants who were not Internet users were probed more deeply on that issue. These figures are discussed in the next chapter.

## 6.9 The Internet as an information source

Similar to their international colleagues, 54.8% of the SA GPs use the Internet for reading online journals. Table 6-11 shows that, although there is low access to sites like Medscape, Physicians Online, WebMD, and MD Consult, the sites of Medline and PubMed have significantly more access to them. As these sites concentrate on traditional and peer-reviewed journals, it might indicate that most doctors are hesitant to move away from these. Simultaneously, however, it must be noted that 24.7% of the GPs accessed "Other Medical sites," so it is also possible that low figures on sites indicate a spread, rather than a concentration.

It is obvious from Table 6-11 that Google is the most commonly-viewed site (and Yahoo also has a high access rate). Interestingly, access to *Google Scholar* is very low. The probability that this was as a result of the Google search engine's being a standard component on many peoples' browser window, and general familiarity with the tool, would have to be explored in the qualitative study.

### 6.9.1 General research

The Internet was seen as a valuable information source in general. The importance of quick access to the latest information was usually seen as the prime motivating factor for using the Internet.

*And the information is very recent, while the text book information is usually not the recent information. So it's more easy, much more easily accessible and much recent books available on the Internet. [Inv007] [See also Appendix 8 for more comments]*

### 6.9.2 Disease management

The Internet was frequently used to deal with queries related to specific problems with patients, often at the time of the consultation. In the survey, 43.2% of the doctors reported using the Internet to search for patient-specific information, and 46.0% of the doctors used it to search for drug information.

In the qualitative study, the motivations behind this appeared to be mainly rare medical conditions, and usually under circumstance that require a quick retrieval of information. Convenience and speed were again emphasised as motivating criteria.

*…just when patients come up with things that I have never heard of before, it's useful that I don't have to sit and sift through text books and text books. I actually just do a search on the Internet, and I can usually get some kind of information. [Inv005] [See also Appendix 8 for more comments]*

### 6.9.3 Online journals and CME

In the survey, 54.8% of the sample said that they read online journals, and 24.3% said that they accessed CME courses or conferences online, although other online conferences were not as popular. From the qualitative study, it became clear that both formal and informal CME was important. For informal CME, a motivating factor was the quick, convenient and inexpensive access to the information from online journals, e-books, and other similar sources.

*I think it's far easier you can you know you can read something, you can do a CME on line and submit it electronically some of them, so you know you don't need to go and find time and then fax it later you can get it to your email, you can fill it in and send it off straight away. [Inv003] [See also Appendix 8 for more comments]*

### 6.9.4 Other themes

Other themes that were raised less frequently were those of finding drug information, especially related to drugs in foreign countries, and linking with pharmacies. In addition (although practice management will be discussed in Section 6.13 below), accessing Medical Aid sites rather than using the telephone was a great advantage.

*if there is, you know, a condition that I don't know about or medication I don't know about, or if I'm wanting to find evidence-based information I can easily access it. [Inv012] [See also Appendix 8 for more comments]*

### 6.9.5 Overall process in research

When the GPs were asked to describe a typical process that they would follow when researching a topic, their first (and sometimes only) port of call was the Internet. The dominance of Google, echoing the figures in Table 6-11, was clear.

*Initially, I start off with Google, and I put down the topic that I am looking for, and then Google basically gives me the options of getting to different sites. Recently, I think most of the searches I have made is via the SAM, and I have been successful on the first visit. [Inv015] [See also Appendix 8 for more comments]*

### 6.9.6 Summary

The activities in Section 6.8 and the foregoing results shows that the SA GPs, like their international colleagues, view the Internet as a valuable source of information in disease management, formal and informal CME, and general research. The convenience, speed of retrieval and currency of the information was particularly valued.

## 6.10 The Internet as a means of communication with colleagues

As was shown in Table 6-10, the Internet is frequently used for communication with colleagues, for both clinical and non-clinical purposes. When these figures are compared with those from the literature review (Tables 5-4 and 5-9), it appears that both visits to the professional bodies' websites and email communication with colleagues is high, and exceed international norms. This level of usage is not consistent across the board, however, with PGPs using email with colleagues (34.0%) significantly less than other GPs use email with colleagues (62.4%). In addition, there was no statistical difference in such usage amongst PGPs from differently-sized practices. Unfortunately, there was not the time in the qualitative study to explore the reasons for the lack of difference in such usage amongst PGPs from differently-sized practices.



The qualitative study on the value of using the Internet for medical practice probed the importance of email with colleagues. Some of the doctors were still inexperienced with this, but all felt positively about the ability to communicate with colleagues via the Internet. They spoke not only about their own activities, but also activities of other doctors. Communication was amongst GPs, and also communication between GPs, specialists, and other health professionals. Once again, convenience and speed of access to data are uppermost in their minds.

*Apart from communicating with doctors in Canada and Australia, that is what I do, I've got buddies in Australia and Canada, and I communicate with them by email, you know, this is what I've got and what we sent to them we use there, can you help* *me?... I email [a medical institution in the USA], I got a patient, what do you guys think, what do you do there, now tell me, then I get an email back, we do this, this and this, think about this and this. Because I'm the only doctor. I don't have a colleague that I can consult with, in my office. [Inv002] [See also Appendix 8 for more comments]*

In summary, the SA GPs find the Internet a valuable tool for communication with colleagues, apparently even more so than their international colleagues. This is particularly noted with GPs working in the public sector. Again, convenience and speed were emphasised, particularly in communicating with international colleagues, and for isolated doctors.



## 6.11 The Internet as a means of communication with patients

Table 6-10 shows that 21.2% (55) of the doctors reported that they communicated with patients via email. On average, these doctors report that they communicate with 6.4% of their patients via email. These figures are also comparable with the figures found in the literature review, but are not equal across the board. While 41 of the PGPs communicated with their patients via email, only 1 CGP and 1 HGP did so. Significantly more urban GPs (52/205) (25.4%) than others communicated with patients via email. In fact, only 3/42 (7.1%) of rural GPs and no peri-urban GPs at all communicated with their patients via email. There was also a tendency for more male doctors, and more doctors in the 35-50 age group to communicate with their patients via email.

Of the 55 doctors, 27 (49.1%) reported that their patients usually initiated the email, 7 (12.7%) that the doctor usually initiated the email, and 21 (38.2%) that it was split equally between patient and doctor (i.e. overall, 67.3% of email communication was initiated by patients). This suggests that email contact with patients is mainly patient-driven. In addition, 27 (49.1%) reported on patients emailing them with questions that they had forgotten to ask during the consultation.

Of the 52 doctors who answered the question about patients asking permission, only 17 (32.7%) reported that their patients usually requested permission. Of the 45 GPs who answered the question on their asking permission, 26 (57.8%) requested permission before initiating email. This, again, would indicate that patients are more comfortable with email as a form of communication than the doctors are, although it is possible that doctors, in the absence of guidelines, are following standard informed consent ethics.

The activities of the doctors when using email with patients are given in Table 6-12.

*Table 6-12: Activities and percentages of doctors using email for these activities, in descending order of frequency (n=55).*

| **Activity** | **Perc.** |
|---|---|
| Answering a question about disease management | 67.3 |
| Claim submission | 51.0 |
| Receive test results | 32.7 |
| Scheduling appointments | 27.3 |
| Sending test results | 27.3 |
| Evaluating a *new symptom* | 21.8 |
| Adjusting medication dosage | 20.0 |
| Discussing a mental health issue | 18.2 |
| Prescription refills | 14.6 |
| Other: | 21.8 |

Closely linked to this, the doctors were also asked what they thought the impact of email with patients would be. All doctors were asked to respond, and 244 (94.2%) answered the question. Table 6-13 gives the statistics of this, and also statistics of the responses of those who *do* use email with patients, and those who *don't.*

*Table 6-13: Doctors believing that email with patients has this impact. Percentages are for full sample, those who do use email with patients, and those who don't. Figures in bold indicate a statistical difference (p<0.05) between these two columns.*

| **Impact of email with patients** | **%** | **Do n=55** | **Don't n=189** |
|---|---|---|---|
| increases general accessibility of doctors to patients | 49.4 | **69.1** | **43.4** |
| saves time on telephone calls | 49.0 | 58.2 | 46.0 |
| allows for greater communication | 46.1 | **65.5** | **40.2** |
| saves time on answering simple questions | 44.9 | **67.3** | **38.1** |
| increases workload | 43.6 | **29.1** | **47.6** |
| increases patient satisfaction | 39.1 | **52.7** | **34.9** |
| improves overall efficiency | 34.6 | 44.5 | 31.2 |
| saves money | 33.3 | 43.6 | 31.2 |
| allows one to deliver better care | 31.7 | 41.8 | 28.6 |
| decreases workload | 19.3 | **29.1** | **16.4** |
| wastes time | 19.3 | 12.7 | 21.2 |
| causes confusion | 18.1 | 10.9 | 20.1 |
| Other | 5.4 | 1.8 | 6.4 |



From these figures, it is obvious that there is a strong link between the doctors' feelings about email with patients and their use of it. This emphasises that, for most doctors, it is a personal choice. (The extent to which this is self-initiated or in response to patient-demand has already been raised and will be explored later in this thesis.) Noteworthy, for the users of email, their usage is in spite of the fact that they don't believe that it decreases their workload.

There is also a need to identify factors that would encourage current users to increase their usage of email with patients, and doctors were asked to identify the possible motivations. Table 6-14 lists the possible motivations, and the percentage of these doctors who indicated each motivation. In the questionnaire, the items were listed randomly. For ease of reference to Rogers' Diffusion of Innovation in the Discussion, they have been categorised according to Rogers' groups.

*Table 6-14: Motivations for increasing email usage with patients, categorised according to Rogers' Diffusion of Innovation groups (n=61)*

| **Motivation** | **Percentage** |
|---|---|
| **Relative Advantage** | |
| Costs were reduced | 49.2 |
| Benefits were clearer | 37.7 |
| **Compatibility** | |
| Patients requested it | 68.9 |
| Your workload were reduced | 63.9 |
| You had more time | 60.7 |
| More patients had email | 54.1 |
| You were reimbursed | 49.2 |
| You could be sure that it would not replace patient consultations | 47.5 |
| Security / confidentiality issues were resolved | 44.3 |
| Liability issues were resolved | 42.6 |
| Patients' privacy problems were resolved | 39.3 |
| Your Internet access was improved | 29.5 |
| **Complexity** | |
| You had greater technical skills | 16.4 |
| **Observability** | |
| You saw it used more effectively | 36.1 |
| **Other** | |
| Other | 1.6 |



Although these responses will be discussed in more detail in the Discussion, the most important factors appear to be demand from patients, and the related points of more time and reduced work load. As these are already users, issues confronting new users (such as complexity and observability), are relatively unimportant.

These tables, however, hide some of the strong feelings that doctors have about communicating with patients via email. These feeling and attitudes were explored deeply in the qualitative study, and are discussed in the qualitative comments below. (The attitudes of those doctors who don't use email with their patients will be examined in the next chapter.)

### 6.11.1 Acceptable topics

Amongst those doctors who communicated via email with patients, the acceptable topics of content were generally limited to administrative issues, and notification of the availability of test results (but not the results themselves).

*You get lots and lots of account queries over the email – lots of them and that helps because a person can put it in writing – in fact, our accounts even state "Don't phone us" If you have a problem, you've got proof, send it to us by fax, or email or whatever, or put it in writing, and they always get a reply in writing, but for not clinical consultation. [CPTFG-02]*

In addition to administrative tasks, keeping contact with patients with chronic illnesses, or with patients at a great distance was also deemed be acceptable. Part of the value of this form of communication was the ability to think carefully and reflect, before answering.

*Some chronic medicine, and I think for chronic complaints it's not a problem because you've got time to think, time to reply, I, I, acute problems, I think there's an expectation that you're on-line several times a day and they get disappointed, so I don't like it for acute problems. [Inv008] [See also Appendix 8 for more comments]*

### 6.11.2 Unacceptable topics

Even amongst doctors who did communicate with patient via email, however, there was the feeling that some topics were not acceptable on email. These included prognosis, consultation, or details of results.

*…but nothing to do with, you know, the prognosis or with a result. I wouldn't feel comfortable, not discussing the full impact of a test that had to be done or a result. [Inv003] [See also Appendix 8 for more comments]*

### 6.11.3 Charging

The issue of charging for emails was raised. Currently, there is no charge, but some doctors do see this as problematic. There is the realisation that could have a financial impact on the doctors:

*Because some patients would, instead of them wanting to come and see you for a consultation or a visit, they would just send you an email and ask how can they improve on this or that without the patient coming to see you, and that could maybe be a threat to our livelihood. [Inv006]*

### 6.11.4 Summary

Similar to their international colleagues, a small percentage of doctors communicates with an even smaller percentage of patients, and the figures are higher for PGPs and urban GPs. The impact of the socio-economic variations are explored in the discussion. In addition, it emerges that, where email communication with patients does exist, it is being strongly driven by patients, and this is likely to impact on the patient-doctor relationship. This impact, including the influencing factors of permission and cost of email, will be explored in the next section and in the discussion.

## 6.12 The patient as partner



The responses from the doctors about email communication raised the broader issue of the patient-doctor relationship. As seen in the introduction and the theoretical discussion, this relationship is changing, and one of the largest changes is the move towards the patient as partner. In Chapter 2, the point was made that, in order for the patient to be a partner in the healing process, that patient should be able to access, understand, and discuss information with the doctor. In this section, the results of issues relating to this and the impact on the patient-doctor relationship are presented.

In the survey, 254 doctors answered the question about patients bringing them information from the Internet. Of these 254, 34 (13.4%) reported that a patient brought information from the Internet at least weekly, and 50 (19.7%) at least monthly. In total, 184 (72.4%) had experienced patients' bringing material from the Internet. Of these 184, 178 commented on the accuracy of patient interpretation, and reported that, on average, 36.8% of the patients had interpreted the material correctly, and 23.4% of the information was not previously known to the doctor. Of the 184, 179 commented on the impact that this had on the consultation: 103 (57.5%) reported that this practice increased the length of the consultation, 79 (44.1%) reported that it increased the quality of the consultation, but only 56 (31.3%) felt positive about patients' bringing information from the Internet.

In the qualitative study, the issue of patients' bringing information from the Internet was explored in detail, and elicited a wide range of strongly-felt opinions.

### 6.12.1 Impact on the length of the consultation

Although doctors reported that this practice lengthened the consultation, they almost always qualified their statements with positive comments.

*Again, it depends on the patient, but in general, I find that the patient is more inquisitive about their disease… Obviously, I see it more in private practice, but I do see it more in diligent patients who will question... but it lengthens the consultation, but I think it's a much more fruitful consultation, definitely to have a more holistic approach to the patients' problems and not just a research tool. [Inv004] [See also Appendix 8 for more comments]*

### 6.12.2 Impact on the quality of the consultation – the positive effects

As mentioned above, in spite of the lengthening of the consultation, many doctors felt that it increased the quality of the consultation, and they gave their reasons and assessment:

*It has certainly an effect on the on the quality of the consultation also, because patients are much more informed, and then they can make really the well-informed choices, they're not ignorant about their condition, so actually, it's quite rewarding for both the doctor and the patient, it improves the quality of the consultation. [Inv007]*

### 6.12.3 Impact on the quality of the consultation – the negative effects

There were, however, several negative effects that were raised by the doctors, even by those who felt that it was beneficial.

#### 6.12.3.1 Quality of the material

Sometimes the information is misleading or incorrect, and this causes tension and confrontation. Again, however, the attitude of doctors towards the quality of the material ranges.

*Any old fool can put any old crap on the Internet, and when my patients come with this, that and the other from the Internet, I tell them that I didn't learn my medicine over the Internet, I learnt it from lectures and books and I point to the bookshelf. [CPTFG-02] [See also Appendix 8 for more comments]*

#### 6.12.3.2 Misunderstanding material

A similar concern is that the material might not be incorrect, but can be misinterpreted by the patients, because of their lack of knowledge, both medical and contextual:

*Patients can end up becoming completely inappropriately worried about various diagnoses, that with a little bit of medical knowledge clearly don't pertain to them at all. [Inv019] [See also Appendix 8 for more comments]*

#### 6.12.3.3 Self-diagnosis

Leading directly from the quality of the material and the patients understanding of the material, is the issue of self-diagnosis, which is inevitable for patients looking up information. This can lead to confrontation with the doctor, and a more demanding consultation, although sometimes it can be a positive experience:

*I had a chap the other day who diagnosed hyperthyroidism on himself, so we could have a, came in with the information and came in with the request that he wanted done for his bloods, and what do you think of this, it made that consult almost like an OSCE, it was quite streamlined and we had a very good consultation from that. [Inv008] [See also Appendix 8 for more comments]*

### 6.12.4 Doctors' overall attitude towards patients' accessing medical information on the Internet

As expected from these comments, there was disparity in the overall attitude towards patients' accessing medical information on the Internet:

#### 6.12.4.1 Positive attitude

Those doctors who encouraged this practice, did so because they found that the well-versed patient meant that the doctor could skip very basic explanations. The strong understanding between doctor and patient also had other benefits, such as better compliance with medication.

Further, the doctors who favoured this practice felt that, if the patient had the time, and was willing to make the effort, then the patient could become a researcher on the topic, and the nature of the consultation changed to one in which the patient brought information to be vetted by and discussed with the doctor.

*I feel that it is useful for the doctor and the patient, for both of them, and it brings them together and the patient is well-versed in medical knowledge, then it is much more easy for the doctor to communicate with that patient, explaining the things in more detail, in more medical terminology, and it develops the relationship between the doctor and the patient and improves the compliance on the medication. It improves overall management if doctors if they can actually discuss what gets done with such a patient who knows a bit about his condition, than a patient who doesn't* *know anything about the condition, so for me it's a big change, useful. [Inv007] [See also Appendix 8 for more comments]*

#### 6.12.4.2 Negative attitude

Other doctors, however, had had bad experiences, particularly with patients' misunderstanding and misinterpreting data, and did not encourage it at all:

*They come in here and they say, well I've just had one, "You said I've got COPD." So I said "Yes, Chronic Obstructive Pulmonary Disease." "Well, isn't it COAD?" So I said, "Well some people call it Chronic Obstructive Airways Disease." "Oh, well I've got this on COAD and this and this, I mean it's a death sentence!" [Inv014]*

*That's a disaster! I don't want to say more! [JHBFG-01]*

### 6.12.5 The disparity between the variables

Given that many of the doctors felt that it increased the quality of the consultation, they were asked why the survey figures reflected that such a low number of doctors felt positive about the practice.

Even for those doctors who enjoyed it, it was a difficult and sometimes undermining process:

*You are immediately up against a whole computer, and all the people that print out or write into the computer, and so you are not being left to just work through the problem at the rate that you've been trained to, in order to help the person in a way that you believe is best.  You are being judged according to Internet and computer and database standards. [Inv018]*

For others, the reasons given focussed on the fact that old-style doctor-centred method of medical practice was being threatened.

*I would say that, probably, it stems from the fact that they don't like being put in a position where they don't know the answers, and possibly also don't like being questioned.  If you look at like a traditional model of a doctor knowing everything and kind of telling the patient what to do it probably doesn't sit comfortably with some people. [Inv005] [See also Appendix 8 for more comments]*

#### 6.12.6 Patient education sites

One possible solution to patients' finding incorrect information, or misinterpreting correct information, is patient education, primarily in the form of referring patients to education sites.  Doctors' use of these sites was examined in both the survey and the qualitative survey.

#### 6.12.6.1 Doctors who look for such sites

Table 6-10 shows that 17.4% of the GPs look for sites to recommend to patients. In addition, 15.5% reported that they recommended sites to patients at least monthly, while 54.0% reported that they *never* recommend sites to patients. Both looking for and recommending sites are more frequent amongst PGPs than CGP and HGPs, and more frequent amongst urban GPs than rural and peri-urban GPs. There is a strong correlation between the doctors who recommend sites and their patients who bring in information. (This correlation was also suggested in the international review (Section 5.3). Of the doctors who recommend sites on at least a monthly basis, 64.1% of them reported that patients brought in information on at least a monthly basis. Of the doctors who never recommend sites, this figure was 18.3%.

*I would like to say that I am building up a bank of information that I can pass on to patients. Unfortunately patients are in the general probably wiser on the Internet than I am, but I am trying to catalogue information, so that if a diabetic comes along I can say well this is the web page where you will find some worthwhile information on what your condition is or what diet you should be following, or something like that. [Inv018] [See also Appendix 8 for more comments]*

#### 6.12.6.2 Fewer recommendations of sites

Other doctors reported very little recommending of web sites to patients. The reason is directly related to the lack of Internet access by patients overall, and more so by patients who are serviced by clinics, hospitals and those in the rural areas.

*No, I don't, but, again my patients, based where I am now, nobody has access to the Internet. I think I would certainly consider it if I had patients who had access to the Internet. [Inv019] [See also Appendix 8 for more comments]*

#### 6.12.6.3 Value of such sites

For the most part, doctors recognised that patient education sites have value as a reference source, especially where patients suffer from chronic diseases.

*Especially people with chronic diseases like high blood pressure and diabetes. Those sorts of sites are very valuable, and you don't have to spend hours and hours going through it with them if you can refer them to a decent site that can give them the same information in their own time, and which they can refer back to repeatedly to kind of reinforce advice. [Inv019]*

#### 6.12.6.4 Official patient education sites

Doctors referred to the fact that flyers from the pharmaceutical companies were useful, except that they often did not have enough of some, while others were never used. An official website of such information, aimed specifically at patient education, was seen as a possible solution.

*the tear-off pages, you know what, it's, I agree, I like that, but I always run out of these tear-off pages, it gets lost. [JHBFG-01]*

*There is a TLC magazine that SAMA brings out quarterly which we leave in our waiting rooms. Now you can trust the information in there, because it's by doctors, for doctors, for patients, and it's in lay language, and it is the proper information, if you can have a er, if patients want to access that, I think we should rather have little business cards that we can give to the patients saying if you want to look up anything, please go to this website. [JHBFG-02]*

#### 6.12.6.5 Payment for the extra work



A "vocal" minority of doctors felt that they should be paid extra for examining patient education sites and recommending them to patients.

*I always add to them [resources] every year, but to actually do it for the patients' sake. And for what? Nobody's going to turn around and say thank you for checking this up on the email, they'll come the next day with 20 pages that they got from some Google site, and they'll have underlined stuff and they want to know this and they want to know that. I'm not going to do that over the Internet then they've got to come in and have a consultation and pay for my knowledge. That's what it's about in the end. [Inv014] [See also Appendix 8 for more comments]*

### 6.12.7 Using the Internet during a consultation

The use of the Internet by doctors during a consultation had not been raised in the survey, but surfaced as an issue during the qualitative study. Those doctors who use the Internet during a consultation generally found a wide range of applications, usually to show something to the patient, or to perform a small administrative task required by the patient.

*I even use it by showing a patient um you get a picture of the spine and this is exactly where your problem is you can show them an anatomical thing, or if you don't, and patients look at you, and they think, "no wait, what are you talking about"? [I] say "O.K. let's find this quickly and I give you a printout. There it is, go and read it at home," that's what I do. [CPTFG-02] [See also Appendix 8 for more comments]*

### 6.12.8 Summary

Patients' use of the Internet has allowed them to access otherwise inaccessible medical material information, and they are bringing this information to the consultation. This practice has had an impact, both negative and positive, on the length of time and quality of the consultation. Most doctors report more (albeit sometimes stressful) fruitful interactions as patients take greater responsibility for the healing process, and increase their role as a partner. There are some doctors, however, who do not like the practice. Problems include patients' accessing inaccurate or too-complex material, and the inevitable self-diagnosis, which can cause further complications if the patient is not guided by the doctor. In addition to this practice encouraging changes in the patient-doctor relationship, and increasing the extent to which the patient is becoming a partner, it appears that an environment in which the patient as partner is encouraged will further encourage patients' seeking material from the Internet (assuming, naturally, that the patients have the resources to access the Internet).

## 6.13 The Internet and practice management

The use of the Internet for many aspects of practice management is high, with online banking figures being the highest overall, and a third file medical aid and insurance claims over the Internet. (The extent to which the travel arrangements are personal or professional is unclear).

The Medical Aid sites would be of particular importance to doctors in private practice, so the relatively high number of accesses is consistent with the high percentage of PGPs in the sample (61%).

The qualitative study revealed that, while a wide range of activities was pursued, most tended to focus on one or two activities only. In addition, some doctor use their Internet connections almost exclusively for practice management, while others did not use it all for that.

### 6.13.1 Billing and claims

In the survey, 89 doctors (34.4% of the sample, or 38.5% of the 231 Internet users) had used the Internet for filing medical aid or insurance claims. This usage, however, was predominantly amongst the PGPs. Of the PGP Internet users, 82/138 (59.4%)

used the Internet for this purpose, while 4/57 (7.0%) of the HGPs and none of the CGPs used the Internet for this purpose.

In the qualitative study, primarily for doctors in private practice, billing and claims was raised as the most important aspect of practice management, and the Internet was seen as crucial to the accounting and financial tracking ability of the practice. This was important whether billing patients directly or working with medical aids and insurance companies. In other cases, however, doctors who ran cash practices did not use it for billing.

Of particular note was the complication, mandatory for submissions to medical aids, of the *International Classification of Diseases and Related Health Problems Codes* (ICD10 Codes). Software that could be used to guide the GP through the thousands of required codes was crucial, as complexity led to inaccuracies.

*If it wasn't for the Internet, I think I still wouldn't have surfaced with this ICD10 Coding, because you can get the information there, so the information that you need to run the Practice these days that's important. [CPTFG-01] [See also Appendix 8 for more comments]*

### 6.13.2 Other uses

Table 6-10 shows that the figures for transferring laboratory results, transfer of patient records and prescriptions or orders are lower than many other activities. The figures for these activities are significantly higher for PGPs than for the other categories of doctors.

In the qualitative study, simple practice management software was seen as crucial for running the practice.  Other activities were also identified.  These included tracking the diseases amongst one's own patients, the booking of patients, and, related to accounts, following up with patients at the time of consultation.

*Yes, often to source blood results, the intranet connected with the health service laboratories.  [Inv010]*

*I run an HIV clinic, so I do all my bookings through the Internet or through MS-Word so I know exactly what's for that day, and I can plan for when I have a patient. [Inv003]  [See also Appendix 8 for more comments]*



### 6.13.3 Other issues

The difficulty of obtaining payment, either from medical aids or from patients, also impacted on activities, usually with negative impact.  For example, the complexity and tardiness of the medical aids often led to doctors' creating cash practices, or having to follow up with patients.

*There are so many different Medical Aids, there's so many different Rules and Benefits, paying so many different fees for consultations – I can't keep track and, to be connected electronically with all the Medical Aids, involves a huge capital* *investment which I'm not prepared to make because the fact is some apparatchik with his certificate of need telling me that I am not wanted. So, I make my patients pay cash on their way out, and let them argue with the Medical Aid. Reduces overheads, keeps administration simple. [CPTFG-01]*

### 6.13.4 Summary

The SA GPs have also reported on the value of the Internet to their practice management. The value and the particular functions depends strongly on the setting, and a wide range of activities are reported. These include filing medical aid and insurance claims, financial work, navigating ICD10 codes, transferring results and patient records.

## 6.14 Personal use

An area not raised in Chapter 2, but raised in the both survey and the qualitative study, is the use of the Internet for personal use. Just as the patient is not an object, so the doctor is also not a medical entity, but a human. There is bound to be personal use of the Internet.

In fact, at a first glance at Table 6-9 and Table 6-10, the high score of personal usage, including entertainment, might be worrying, as it might conjure an image of a GP in the office all day performing personal work. What has been seen, however, is that doctors have compensated for lack of usage from work by having Internet access from home; given that GPs access the Internet more from home than from any other location, a high personal use is to be expected.

## 6.15 Usage in comparison to the rest of the world

A fact that strikes one when looking at the usage patterns and activities of South African GPs, is that there are similarities with their international colleagues. For example (and these will be discussed in more detail in Chapter 8), what has been seen is similar Internet uptake and usage amount (89% usage), usage rates of email with patients, problems of workload and time, relationships between usage age and gender, and the similarities of the activity usage between the SA GPs and the those from the literature review. This is in spite of the fact that South Africa lacks the infrastructure of developed countries.

In the qualitative study, this issue was probed further. The single most important reason that emerged was that doctors in South Africa feel themselves to be part of the medical fraternity, with the same training, interests and concerns, and financial resources. This had been raised earlier when doctors were asked about their emailing with colleagues, and several automatically assumed that ‘colleagues’ included doctors in other countries.

While there was a recognition that some conditions are unique to South Africa, and that this would have an impact on usage, it was not enough to overcome the common ground. They also feel that, where they are lacking, the Internet can help to close the gap between their knowledge and the rest of the world’s knowledge.

*It's about the fact they need the same kind of things from the Internet that those doctors do and it makes practising easier. It makes it more interesting, you know, once you have worked with it, it's actually pretty impossible to work without it. [Inv005]*

*Probably we've got universal problems seeking universal solutions. Our patients have got the same sort of problems. ... I don't think that the fact that not everybody's got Broadband in South Africa is going to stop them from looking for answers on the Internet. [Inv018] [See also Appendix 8 for more comments]*

In summary, the crucial point is that the SA GPs see themselves as part of the international medical fraternity with similar needs and problems, and this similarity drives their use of the Internet in much the same way as it does the usage of their international colleagues. It is apparent from the data that Rogers' concept of homophily is strongly felt by the SA GPs.

## 6.16 Conclusion

This chapter has presented the first part of the usage results of the survey and the qualitative study, concentrating on the five study areas identified in Chapter 2, and presenting the results in comparison with the literature review and the theoretical background. Noteworthy is the fact that, in this limited survey, usage of the Internet by South African GPs is high, with penetration at approximately 90%. In addition, usage patterns are similar to the usage patterns found in the international literature review. It appears that lack of access is a problem.

Although brief contextual comments have been made, this chapter has concentrated on the presentation of results of Internet users; these will be discussed in more detail in Chapter 8.

In the theoretical discussion in Chapter 3, acknowledgment was made that a too great concentration on the adopters of the technology will give skewed results. For this reason, before discussing all the results, it is necessary to present the data from the non-users. In addition, the study has raised issues not anticipated in the Introduction, such as the after-hours Internet behaviour of the GPs. While these have been alluded to here, they will need to be explored in more detail.

# Chapter 7: Results: Use of the Internet by South African GPs – Non-users and Other Issues

## 7.1 Introduction

The previous chapter concentrated on the use of the Internet, the reasons and the benefits of such usage. General figures were presented, and the five study areas were examined explicitly.

There is a greater context that must be taken into account so that the discussion of usage in those five areas can be balanced by those doctors who do not use the Internet at all, or who use only specific aspects of it. From the figures given in the previous chapter, we know that at least 10% of all South African GPs do not use the Internet at all, and that 40-50% do not use the Internet from their place of work. In addition, even amongst the users, there are some activities (such as email to patients) not performed.



Although some of these have been touched on in the previous chapter, it is necessary to present the results of non-use of the Internet in more detail. This is required primarily for four reasons:

- to answer Research Questions 1 and 2 more completely: to understand the relationship between ASM, DoI, and Internet usage patterns, factors affecting non-usage also need to be taken into account;
- to answer Research Question 3: to understand the barriers that prevent doctors from using the Internet, with a view to removing those barriers if those doctors so wish;

- to understand that there are valid reasons for non-use, and that these may serve as warnings on the use of the Internet, and
- given the possible value of the Internet to the delivery of health care in South Africa, to understand the impact of the non-use of the Internet amongst SA GPs.

## 7.2 The non-users of the Internet

In the survey, although only 23 GPs had no access to the Internet, 28 GPs said that they do not use the Internet at all – i.e., in neither their professional nor personal lives. Of the 28 non-users, 20 (71.4%) were PGPs, (4) 14.3% were HGPs, (2) 7.1% were CGPs and (2) 7.1% from other areas. There were 19 (67.9%) male non-users and 9 (32.1%) females. The mean age was 50.9 (as opposed to 42.8 of the users), with the three age groupings of < 35 (6 (21.4%)); 35-50 (7(25.0%)); >50 (15(53.6%)). Although care must be taken when interpreting statistics of a group of 28, this age difference reflects the impact of age on usage discussed in Section 6.5.3.1.

Of these 28 doctors, 9 said that their place of work had access to the Internet: 2 through a 56Kb dialup, 3 through a network, and 4 were unsure of the method of access. Only 1 said that there was access from home (presumably used by another family member).

From the literature and the pilot, 16 possible reasons for non-use were identified, and these non-users were asked to indicate their reasons for not using the Internet. Table 7-1 lists the reasons, and the percentage of these doctors who indicated each reason.

*Table 7-1: Reasons for not using the Internet, in decreasing order (n=28)*

| **Reason** | **Perc.** |
|---|---:|
| Novice or inexperienced user | 50.0 |
| No time | 46.4 |
| No access at clinical practice | 42.9 |
| Workload too great | 42.9 |
| No computers in examining rooms | 35.7 |
| Lack of interest | 32.1 |
| Connection too slow | 10.7 |
| Cost outweighs benefits | 10.7 |
| Not aware of good sites | 7.1 |
| Too expensive | 7.1 |
| Lack of reimbursement | 7.1 |
| Too much information to scan | 7.1 |
| Software incompatibilities/problems | 3.6 |
| No valuable content | 0.0 |
| Navigation or searching difficulties | 0.0 |
| Specific information not available | 0.0 |
| Other | 0.0 |



While this identified the barriers, the doctors were also asked to identify circumstances that would motivate them to use the Internet. Table 7-2 lists the possible motivations, and the percentage of these doctors who indicated each motivation. In the questionnaire, the items were listed randomly. For ease of reference to Rogers' Diffusion of Innovation in the Discussion, they have been categorised according to Rogers' groups.

*Table 7-2: Motivations for using the Internet, amongst non-users, categorised according to Rogers' Diffusion of Innovation groups (n=26)*

| **Motivation** | **Percentage** |
|---|---:|
| **Relative Advantage** | |
| Links to Continuing Medical Education | 26.9 |
| Financial incentives | 7.7 |
| **Compatibility** | |
| Information relevant to my practice | 23.1 |
| Remuneration for web-based clinical activities | 11.5 |
| **Complexity (reduce)** | |
| If I had training | 42.3 |
| If I had technical support | 19.2 |
| **Trialability** | |
| If I could try it free for 2 months | 15.4 |

| Motivation | Percentage |
|---|---|
| Ability to evaluate the effectiveness of using the tool | 11.5 |
| **Observability** | |
| Recommendations from credible sources | 23.1 |
| **Other** | |
| Other: | 11.5 |
| **Nothing** | |
| Nothing would motivate me to use it | 26.9 |

Three of the participants who had identified themselves in the survey as non-users, participated in the qualitative study.

The issues of use and non-use, however, were not absolutes. In the time between the survey and the interview, one of these doctors had changed practice, and had since become a user. In addition (and from what has already been seen), even amongst the users, there was a wide range of activities for which they used or did not use the Internet, and so their input into the various themes was recorded also.

The barriers to usage and motivations for usage were probed in more detail in the qualitative study, and the major themes are discussed here.



### 7.2.1 Expertise

Both Tables 7-1 and 7-2 identify perceived lack of expertise as the single greatest factor preventing doctors from using the Internet, or aspects of it. Doctors appeared to be in need of formal training. (Again, although the small number of 28 makes comparison difficult, the fact that more than half the non-users were over the age of 50 means that it is unlikely that the majority of the non-users received computer training during their student training). Even doctors who were Internet users expressed the view that their training was inadequate for the required tasks. In addition, the fact that "links to CME" scored so highly as a factor that would motivate a non-user, is both a function of the lack of CME sites, and also the fact that many doctors simply don't know that the CME sites exist – again, this is an aspect of training.

*I think, I mean, if I think about myself, I'm pretty computer illiterate, and what I know about using the Internet is what I have sort of figured out by trial and error, and so I suppose that I could definitely refine what I am doing a lot more if I had a little bit of training or a bit of knowledge about where I should go and what I should search. [Inv005]*

*So, once you finish your medicine, you don't have any idea what is a computer. You, the old Professors they will train you that a doctor is a clinician, meaning you are always there with the patient. [JHBFG-04]*

Although some software courses did exist, they were inadequate, especially when the systems to run the software are unavailable to the doctors in their place of work.

*They give us these ICD10, they also take us to the course, but they didn't give us the software. You go to that course for one day – yet they want you to put it the diagnosis, you say er, abdominal pain. They don't make a clearer diagnosis of abdominal pain, so I don't understand the use of that particular software, because we can't access it. It's being used by the class, but yet we have to write the diagnosis. [JHBFG-04] [See also Appendix 8 for more comments]*

### 7.2.2 Time and workload

Time and workload proved, yet again, to be important issues. (The previous chapter showed that many GPs compensated for the lack of time at work by using the Internet from home.) In fact, one of the problems with this study was the need to re-schedule interview appointments, frequently to after-hours, because of time constraints.

*…that would be the time I would do it, in the evening when, before going to bed. Less intense, in the day time, it's, I find it's just too rushed and too busy to concentrate and absorb the stuff, it's quite nice to do that research and that reading when you are more relaxed and you've got your feet up. [Inv008] [See also Appendix 8 for more comments]*



### 7.2.3 Difficulty of access

Access to a computer appeared as a crucial factor in the use of the Internet, particularly for those doctors who work primarily in the public sector, and also in the rural areas. Access to the Internet appeared to be a complex interaction between availability of technology, and hospital and clinic procedures.

*Generally, find that in the rural areas not everyone's got their own computer, so I think it would be a lot easier to do that research and that stuff where you have not got people waiting for the machine or where you've got your own space to do it in. [Inv008]*

*Where I work currently, we have one PC for all the health professionals that work in the hospital, so it's about 11 of us and it doesn't have access to the Internet, so it's just an accessibility problem, more than a lack of desire to use the facility. [Inv019]* *[See also Appendix 8 for more comments]*

### 7.2.4 Intrusion on their personal lives

The previous chapter showed that lack of time at work had led doctors to use the Internet at home. This practice, however, was not viewed as acceptable by all doctors, some of whom felt that the intrusion into one's personal life was simply too great:

*You know there comes a time eventually when you have built up a practice, when you need 'me' time, 'down' time, and then to spend it on the Internet while I could either be reading something, or doing a hobby, or going out to eat with my wife, or whatever, I'm going to sit on this bloody Internet, and I find it a frustrating experience I must tell you. [Inv014]*

### 7.2.5 Lack of interest

Tables 7-1 and 7-2 also show that 9 (32.1%) gave "Lack of Interest" as a reason for not using the Internet, and 7 (26.9%) said that nothing would motivate them to use the

Internet. In the qualitative study, various reasons such as age, old habits and a dislike for computers emerged:

*No, I'm all for it [use of the Internet by doctors], basically I haven't been trained that way and you know at my age, I'm looking at maybe another 2 years of practice. I really couldn't be bothered, so to speak. [Inv009] [See also Appendix 8 for more comments]*

### 7.2.6 Cost of Internet access

The cost of Internet access in South Africa is generally regarded as high [314]. Although mentioned by the doctors, it was not an important reasons selected by the doctors in the survey. In addition, comments in the qualitative study indicated that doctors were aware that costs were being reduced, and that was becoming even less of an issue.

*They would have access and be able to afford that as opposed to countries with very poor infrastructure that struggle just to get access and more. [Inv003]*

*[With] broadband becoming more and more accessible, prices are coming down especially with mobile broadband that one can use without using a Telkom ADSL line [Inv007]*

### 7.2.7 Summary

From these data, it appears that a minority of SA GPs do not use the Internet at all. The main reasons for non-access were lack of experience or training (expertise), lack of time, access and too great a workload, fear of intrusion into their personal lives, cost of access, and simply no interest. Similar patterns emerge when querying factors that would motivate doctors to use the Internet.

## 7.3 The impact of non-use of the Internet on the delivery of health care

Given the wide-spread usage of the Internet, and the beneficial aspects cited by the users, users and non-users commented briefly on the possible impact of non-use of the Internet:

### 7.3.1 The users' perspective

Users of the Internet felt that there would be a severe impact on non-users of the Internet. The reasons primarily focused on the five areas of study, and the feeling was that they would not have access to the latest information. Efforts to use other methods would not be as effective.

*I think they probably get left behind, kind of stuck with their old typewriters. [Inv003]*

*I just think that you miss out a lot, you know, just in terms of being able to access information, it's so easily accessible. So, I suppose in terms of continuing professional development you would lose out on it, you would lose out on latest developments. [Inv012] [See also Appendix 8 for more comments]*

### 7.3.2 The non-users' perspective

Amongst the none-users, responses varied. Those who had access to other resources do not see the impact as a grave issue. They are aware of the Internet as an information source and as a tool for communication, but use other, more traditional methods, or use a computer system that is not connected to the Internet. They can also access the Internet vicariously, through other people, usually family.

*It's easier to get the information I want elsewhere. I sometimes phone the university or I phone a colleague or a specialist colleague and I get what I want...I've surrounded myself with computer literate people who can, you know, look up things for me. [Inv009]*

In addition, there is the perception that users over-rate the value of the Internet, under-rate the problems associated with it, and do not use it as widely as they claim.

*You know a guy might sort of look up something once, and say no, but this increased his knowledge of medicine, but I think generally, I don't think too many guys use to much of the Internet there just isn't time… you know a lot of colleagues say they sit in* *front of Internet night after night reading up and their wives have a different story, they say they normally sit and sleep in front of it. [Inv009]*

For those doctors who do not have access to other resources, however, the Internet offers hope as the only viable resource, because the alternatives are outdated texts.

*It's a serious problem that I have realised, especially where there are knowledge sources in the deep rural areas where you will be relying to an old book which the last author or it was revised maybe in 1990, 1989 and we are in 2007. [JHBFG-04] [See also Appendix 8 for more comments]*

### 7.3.3 Summary

Because of the benefits of the Internet to medical practice, as identified by the users, they perceive that their colleagues who do not use the Internet will have a severe negative impact on their practice of medicine. While some non-users feel that much of the required information can be sourced from elsewhere (including using the Internet vicariously), others recognise that accessing old information is a "serious problem."

## 7.4 Non-use of email communication with patients

The previous chapter examined the use of email with patients. Table 6-10 showed that only a minority of GPs (21.2%) used email with patients, and frequently, they had some reservations and conditions.

In the survey, doctors who did not use email with their patients were asked for their reasons. A total of 194 doctors responded, and the results are given in Table 7-3. In the questionnaire, the items were listed randomly. For ease of reference to Rogers' Diffusion of Innovation in the Discussion, they have been categorised according to Rogers' groups.

*Table 7-3: Reasons given by doctors for not using email with patients, categorised according to Rogers' Diffusion of Innovation groups (n=194)*

| Reason | Percentage |
|---|---|
| **Relative Advantage** | |
| Benefits not clear | 26.3 |
| Cost | 7.2 |
| **Compatibility** | |
| Too few patients with email | 57.2 |
| Adds to workload | 45.9 |
| Never been requested | 44.3 |
| Time (too many emails) | 33.0 |
| Security / confidentiality doubts | 27.8 |
| It replaces personal visits | 23.2 |
| No easy email access | 21.7 |
| Patients' privacy problems | 21.7 |
| No email access at all | 18.6 |
| Liability issues | 16.5 |
| Lack of reimbursement | 16.5 |
| **Complexity** | |
| Lack of knowledge | 12.4 |
| **Trialability** | |
| Cannot try without commitment | 2.6 |
| **Observability** | |
| Have never seen it used effectively | 11.9 |
| **Other** | |
| Other: | 7.2 |

In addition, the previous chapter (Table 6-13), showed that the doctors who did not use email with patients felt that the benefits were not as great as the users felt, and that 47.6% of the non-users felt that it would increase their workload.

In the qualitative study, the doctors went into more detail about the problems that they had with using email with patients, and the impact of using email with patients. Some gave their reasons in detail, while others were very blunt. ("*I'm not for emails." [JHBFG-03]*)

Their concerns are given below:

### 7.4.1 Too few patients with email

As reflected in the figures, many of the doctors pointed out that either they or their patients, or both, did not have access to email. This was evident especially in the clinics, hospitals, in the rural and peri-urban areas.

*Just very different from a GP setting, a hospital emergency department is quite different, and the range of clients we see as I say are very rarely, even have telephones so we have to make provision for all patients in that sense and how to communicate with them. It's all quite rudimentary for the majority of people. [Inv010] [See also Appendix 8 for more comments]*

### 7.4.2 Impact on personal life

Just as there was some fear of Internet use intruding on doctors' personal lives in general, this was more pronounced in the discussion of email. Doctors felt that email with patients, increasing their accessibility, would lead to a disruption of their personal lives.

*The other thing that would worry me more is that patients could disrupt you at any time by sending emails all the time. I'm experiencing that at the moment with sms's. The patients send me sms's now, and it tends to be a bit disruptive. [Inv006] [See also Appendix 8 for more comments]*

### 7.4.3 Impact of online communication

Most of the doctors who were not happy with the prospect of emailing patients said that they preferred a face-to-face consultation, or even telephone, for what they invariably referred to as 'the personal touch, ' and to avoid misunderstanding and misinterpretation.

*Just the same as I will not diagnose and treat over the phone. They must come in – doctoring is a personal business. They must come in, they must give a history and they must be examined, and the management must be discussed, and that cannot be done on email. [CPTFG-01] [See also Appendix 8 for more comments]*

### 7.4.4 Confidentiality and security

Confidentiality and security were also raised as problems. Doctors were aware of the fact that patients had their computers at home, where access to email would not always be strictly controlled, and that this would impinge of patient's rights to confidentiality.

*one of the issues is obviously confidentiality, you know not knowing exactly who is going being to be able to open the email and look at it especially where families share email addresses and that sort of thing. [Inv005] [See also Appendix 8 for more comments]*

### 7.4.5 Time

Time had been raised as an issue impacting on Internet usage in general, and was raised again in the context of email with patients. Doctors feel that using email with patients would simply take up too much valuable time.

*No, there is no time for that, thank you. I've got 4, 6 I've got 10 people working for me they can email them, I have no time for that. [Inv002]*

*the time constraints is quite a problem in a sense that I would probably access my email every second or third day, and I probably won't look at my email every day. [Inv015]*

When looking at the survey data only, it appears that the main reason that doctors don't use email with patients is because too few of their patients have access to email. The figures in the tables dealing with confidentiality, legal issues, replacement of personal visits, are very low in the ranking. A reading of these data only, however, is misleading, and the extent to which it is misleading becomes obvious in the discussions with the doctors. While too few patients having email access is a major barrier, many of the other barriers to doctors not wishing to use email with patients centred on concerns for the patient and the delivery of health care. While the use of email might be acceptable for a few specific tasks, and possibly for a few specific patients, it is not seen as a viable method of general medical communication with patients.

This disjuncture in statistics implies that, while patients' not having access to email is common for most of the doctors, the main reasons lie in the other categories; in the tables, it appears that doctors' feelings are spread across those categories.

### 7.4.6 Summary

In line with their international colleague, most SA GPs do not use email with patients. An important factor, because of SA's socio-economic situation, is that too few patients have access to the Internet. Other factors, however, include a fear that this practice would impact on the GP's personal life, would impact negatively on the patient-doctor relationship, may lead to errors, may have confidential and security problems, and would take up extra time.

## 7.5 Non-use of the Internet during consultations

In the previous chapter, doctors who used the Internet during consultants gave their views. A large number of doctors, however, did not use the Internet during consultation. Apart from the fact that many do not have access to a computer during the consultation, others felt that it would waste time.

*I think it will be difficult, because the workload of patients is so that there is not enough time to stand on the PC while seeing the patient. [Inv007]*

*I'm not sure, I mean in theory, yes, definitely it's very useful, but in practice, the type of time constraints that one is under, makes it's difficult to spend too much time picking things up on the Internet. I suspect it depends a little bit on what sort of thing you want to know. So, yes, I guess there is definitely a place for it to be used, but I'm not sure of the practicalities in terms of actually having time in the consultation to look things up. Ja, it's difficult to say. I expect it there would be time pressures. [Inv019]*

## 7.6 Non-use of the Internet for practice management



Doctors who did not use the Internet for Practice Management did so because of a variety of reasons, usually because they ran cash practices, or were part of a larger group, or worked in a State facility only.

While 59.4% of the PGPs used the Internet for medical aid claims, 0% of the CGPs and 7.0% of the HGPs used it for this purpose; this is understandable, given the nature of the operations in the different settings. In addition, several of the PGPs said that the difficulty of the medical aid system had forced them into a cash business.

*No, I'm working for the State so just really medical [Inv003].*

*I have a cash practice I don't claim directly from medical aid I just run on a simple database, although I do, sorry I do email my invoices. [Inv005]  [See also Appendix 8 for more comments]*

## 7.7 Google Scholar

A final comment needs to be made on a striking statistic – the lack of use of Google Scholar, amongst all the Internet users.  While the need to access information would explain the high degree of access to Google, an issue raised in the previous chapter was the low access to Google Scholar.  Given that Google Scholar is aimed at searching publications, it would be reasonable to suspect that it would have a high rate of access.

In the qualitative study, when asked why they did not access Google Scholar, the doctors' responses confirmed the suggestion made earlier, it is because of ease of access to Google, and lack of familiarity with Google Scholar.

*I usually just put in my word that I'm searching for and press search wherever Google I use Google but I don't use Google Scholar.  I use Google straight I use that… I don't actually know about Google Scholar. [Inv002]  [See also Appendix 8 for more comments]*

## 7.8 The GPs and the survey

The process of the survey itself revealed particular issues that need probing in the qualitative study. These included the number of doctors who responded online, the overall response rate, and the responders' reasons for responding.

### 7.8.1 Percentage of doctors responding online

Although 89.2% of the doctors had access to the Internet, only 7.4% of the participants responded online. In the qualitative study, those who had not responded online were asked for their reasons for not doing so. For the most part, it was more convenient to work with paper, both because of their familiarity with paper, and also because it required no special technical skills:

*I often I find when you have fill in a questionnaire, sometimes you've got to battle with spacing and answering a thing in the right block and I probably just thought it would be quicker. [Inv005] [See also Appendix 8 for more comments]*

That said, almost all of the participants said that, if the survey form had arrived online only, then they probably would have completed it online. This, and the high percentage of doctors using mail, indicates that future surveys on doctors might possibly be performed online only. It would, however, mean that non-users' views would be lost.

### 7.8.2 The overall low response rate

In the qualitative study, doctors were asked for their views on why they thought that the response rates to the survey had been so low.

Usually, based on personal experience, several felt that 10% was not really a low figure:

*I suppose 10% may be fairly comparable to the response rate in any sort of survey, not necessarily connected to the Internet. I think most responses to surveys are pretty low, I wouldn't think that the subject matter has anything to do with it…Oh, doctors are notorious for not communicating. [Inv013]*

Nevertheless, the reason for the low figure was probed more. As seen in many of the comments made by the doctors in the qualitative study, their time is generally very short, and this was again an issue affecting the response rate. In addition, they felt that doctors were over-surveyed.

*I think time constraints is the problem. [Inv004]*

*You know, it's just, "Aw, here's another survey." You cannot believe, at least once a week, I'll get one of these marketing companies phoning me, whether I want to participate in a survey. [Inv014] [See also Appendix 8 for more comments]*

### 7.8.3 Their reasons for responding

The reasons for responding to the survey were almost always personal. They were or had been involved in research or understood the value of research, they were interested in the topic, felt a sense of social responsibility, wanted people to know their feelings on the topic, they had the time, or felt sorry for the researcher. One said that he liked completing questionnaires.

## 7.9 The GPs' needs and vision for the future in respect of the five study areas



Finally, the doctors were asked to describe their needs regarding Internet usage in the future, and also their vision for the use of the Internet by GPs.

Of the 48 GPs who did not have access from work, 33 (68.8%) said that they did want access. All the doctors interviewed felt that GPs' use of the Internet in South Africa would increase dramatically. Their needs reflected the issues raised in the five areas of study.

### 7.9.1 Information

They felt that the amount of information would continue to grow, but there was a need for easily accessible quality information:

*I think it's going to grow, I think it's going to grow tremendously. I would like to see more good quality sites for lower prices or for free. [Inv004] [See also Appendix 8 for more comments]*

### 7.9.2 Communication with colleagues

Communication with colleagues was seen as essential for medical practice, and the doctors felt that it needed to become more organised to be more beneficial.

*It would probably be nice to be able to voice more of the concerns and have more, almost interaction with more GPs, and I suppose that's why the use of IPA is there, because I think that doctors are not unified, there is the problem of being dictated to a lot by the medical aids and by the government. [Inv008]*

*Being able to, I mean, we do that quite a bit here, out in the rural area, sending, you know, sending x-rays via email for opinions by specialists and getting, you know getting second opinions on cases that we are struggling to treat or diagnose. I think that is very exciting area, and certainly especially for people like us that are stuck in the middle of nowhere, it's a very useful tool to have. That's probably the most important use of the Internet for me that I would like to see going further. [Inv019]*

### 7.9.3 Communication with patients

Although problematic, using email to communicate with patients was bound to increase.

*I think that if we are able to use the Internet more and more it kind of makes it easier to keep track of patients and to communicate with patients and with other doctors. [Inv005]*

*I think there's going to be more interaction with patients, because I think that's going to be a preferred form of communication. [Inv008]*

### 7.9.4 Patients as partners

The concept of the patient as partner is firmly established, and the Internet needed to be used to cement this new way of working.

*I think the role for patients learning more from the Internet is there ... I think it depends a lot on how much the patient can actually access the Internet it's one thing for the doctors to suggest you can go and visit the site but does the patient actually have access?... There is definitely a role for more Internet-based patient awareness. [Inv003]*

*If you have intelligent patients out there which there obviously, are, I would like them to have access to it as well. [Inv017]*

### 7.9.5 Practice management and administration

There was a great need for systems that would ease the burden of practice administration. Not only did the current systems need improving, but they also needed to be become more widely-spread.

*Well, I can only imagine that it is going to become more and more common, and that we are going to use the Internet more and more for various aspects of practice management and general kind of information usage as well. [Inv019] [See also Appendix 8 for more comments]*

### 7.9.6 Other needs

Other needs included the need for Internet access from work for those who do not have it, and faster access.

*I would like everybody to have access to it, all the doctors to have access to it…I would like to use the Internet that is just absolutely instantaneous with no hassles. [Inv017]*

*Well, it would be lovely to have the Internet at work for me, because not having it is a pain. [Inv019]*

### 7.9.7 Summary

The SA GPs foresee a growth of the importance and use of the Internet as a source of medical information, communication with colleagues, communication with patients and practice management. In addition, there will be an impact on the patient-doctor relationship. There is the wish for structured developments, guidelines and higher quality access.

## 7.10 Conclusion

This chapter has focused on the GPs who do not use the Internet. This included those doctors who don't use the Internet at all, and also those who might use it, but don't use it for particular purposes, such as email with patients.

Their reasons reflect many of those given by the Internet users, such as lack of time, workload, and lack of access at work. In addition, however, they cite lack of expertise as a major factor preventing the use of the Internet.

Although many of the results have been interspersed with comments, the next chapters will discuss the results of usage and non-usage in more detail, and in relation to the theoretical background.

# Chapter 8: Discussion

## 8.1 Introduction

The framework of the first two research questions, each focusing on a different theory, will guide the discussion of the results in this chapter. (The third question will be dealt with in the next chapter). Although these are two separate questions, as the discussion unfolds, it will become apparent that they are closely interlinked, and that answering the question in regard to one theory will necessarily draw also on information from the other. For that reason, although each theory will have a greater or lesser role to play in understanding different datasets and behaviours of users, there will be movement between them. The final over-arching theoretical model attempts to conflate the two into one model that can be applied to the South African Primary Care doctors' use of the Internet.



The chapter begins with a general view of the results in the light of DoI's predictions (made in Section 5.5), and then looks in more detail at access and usage information. From there, it comments on the results of the five areas of study in the light of ASM, DoI, the international literature review on usage, and also on the queries raised in the earlier parts of the thesis. The principles from these strands will be merged into theoretical models of the issues and processes, which will be depicted diagrammatically.

## 8.2 DoI, ASM and overall access and usage figures

This general section begins by examining and explaining the overall usage patterns in the light of DoI and ASM. It will include a discussion of the factors affecting these patterns: physical infrastructure, time, expertise, organisational access, sociological factors and cost. After this examination, the information is synthesised into a model, which then allows for reflection back to the theories.

### 8.2.1 Overall usage amount

DoI predicts that the usage of the Internet by SA GPs should be higher than the mean of the population. This is primarily because of their education and economic position in relation to the mean of the SA population [15]. Indeed, the figure of 89% access and usage is far higher than the mean of the SA population, which was 10.8% in 2005 [315].

More specifically, DoI predicts that SA GPs' usage patterns and levels should be similar to the usage patterns of doctors elsewhere in the world. The first stage to examining this is to look at specific activities, and the data on this (Section 6.5.2 and Table 6-10) partially bears this out. There are expected statistical differences in the percentages of specific activities (expected, because at this level of detail of a study with many socio-political variables, a great majority of matches would be unlikely, even suspicious). Nevertheless, five of the 13 activities are statistically consistent with the first review, six with the second, and all but one of the items are between the minimum and maximum range of the items in the literature review. In addition, email is the most common activity, and the relative ranking of the various activities is not statistically different between the SA GPs activities and the activities in the literature review. This relationship is reinforced by figures from other studies [84; 312; 353; 354].

These activities, however, are only a small part of the overall usage patterns, and these usage patterns will be examined in more detail in the sections to follow.

### 8.2.2 Overall usage over time

Unless one is conducting a longitudinal study, usage over time requires recall, and so can be studied on a general level only. Because a longitudinal study was not feasible, the question dealing with usage over time dealt only with usage of the Internet in general, without references to specific activities.

When comparing the graph showing first year of access for the GPs (Figure 6-2), to the graph from DoI (Figure 3-8), one can see that DoI predicts the general curve. In addition, from the high number of GP users at the start of the graph, it appears that critical mass was reached in or before 1996, before a take-off from 1997.

It is necessary to examine, in some depth, the factors that influence this curve, because it is these factors that will give some insight into the future usage of the Internet amongst SA GPs. This will be done in later sections of this chapter.

### 8.2.3 Overall usage location

The Internet is referred to as a professional instrument in ASM (Figures 3-4, 3-6 and 3-7). Although overall usage of the Internet by the GPs in this study is high, and GPs are using the Internet as a tool to increase quality of health care delivery, usage is inconsistent, and usage from work is frequently replaced (or at least complemented) by usage from home. This is a complicating factor in the ASM, as ASM discusses the workplace, and does not include professional usage of the instrument from home. For this reason, and because home usage is so high amongst these doctors, it is necessary to look in some detail at the doctors' reasons for using the Internet from home.

### 8.2.4 Physical infrastructure

The use of Information and Communication Technologies (ICTs) in health care delivery in Africa has not been studied widely. Authors who have investigated ICTs in Africa are painfully aware of the impact of the lack of infrastructure [163; 355], and models of diffusion in developing countries offer only a broad background, highlighting the importance of the lack of infrastructure [356]. The reliance on the 56 Kb dialup of the SA GPs in this study impacts on cost and efficiency, and will certainly impact on the GPs' ability to use highly interactive websites, especially those with video. This impact means that the doctors do not achieve a "good user experience" [357].

There are several infrastructural indicators relevant to the period of this study that show that South Africa has far less infrastructure than most developed countries in the world, although this is changing slowly. South Africa's Economist Intelligence Unit's (EIU) 2006 e-readiness ranking was 5.74, far below the average of 8 for Western Europe (and the 8.9 for the USA, and the world's highest of 9.00 for Denmark) [358]. In the 2003 ITU Digital Access Index rankings, South Africa was rated 78th in the world [206], with less than 9% of the population having a computer at home in 2002 [207], and less than 7% using the Internet [206]. As noted earlier, Internet usage had increased to 7.9% by 2004 [314] and to 10.8% by 2005 [315].

Nevertheless, South Africa's infrastructure is not the worst in the world, and is one of the best in Africa [163; 355]. Its EIU e-readiness ranking of 5.74 (5.95 in 2008 [359]) is higher than most Eastern European, Southern American, and all other African countries [358; 359]. The *Economist's* 2008 "Connectivity and technology infrastructure" index places it third in Africa (although it includes Israel and the United Arab Emirates [359] as part of that evaluation). Other estimates of technological infrastructure range: some 25% to 40% of Africa's cell-phone and 45% of Africa's Internet subscribers are in South Africa [163; 315], SA's 2005 figure of 10.8% of the population having access to the Internet is far higher than Africa's average of 3.7%, closer to the world average of 15.3% [315], and 77% of the SA population has access to a computer via a cellular handset [360]. By 2006, 99.8% of the country's population had mobile phone service (Global System for Mobile communications, or GSM) coverage [361]. From this information, it is apparent that, while services are variable, there is an overall existing infrastructure on which to build.

The results have shown the impact of poor physical infrastructure, where it exists. Sadly, and predictably, the most underserviced areas are using the Internet less than the well-serviced areas. The irony is that, based on the doctors' activities shown in the results, these doctors have the greatest need for access and usage.

These broad statistics do not show the more complex nature of infrastructure and usage that has been indicated by the results of this study. The emphasis on physical infrastructure is understandable, but, as was found in the international study also, Internet *access* at an infrastructural level does not necessarily mean Internet *usage*. As is seen in Tables 6-4 and 6-14, and Section 6.6.2.5, there is not a simple correlation between access type and usage. There are obviously other factors at play, and these other factors lead to contradictions. This is clearly demonstrated when viewing access and usage in the PGP environment – the superior access of doctors working in larger practices does not automatically increase the amount or frequency of usage. The physical presence of the instrument in ASM may exist, but DoI requirements for adoption are not being met, and so effective usage of the instrument is being compromised.



The relationship between poor infrastructure at work, and rate of usage from home, is also complex. From the survey, it is only for the PGPs that the statistics allow one to propose that the poor physical infrastructure at work encourages home usage. The reason that this relationship could not be investigated on a wider scale for under-serviced areas, was primarily because of the small numbers of respondents from those areas. In these cases, the qualitative comments certainly indicated that poor infrastructure at work encourages home usage.

The concentration on physical infrastructure, while understandable and important, must be broadened to include other factors. These other factors are discussed below.

### 8.2.5 The other major factors

#### 8.2.5.1 Time

The results (Sections 6.5.1.1, 6.5.3.3, 6.5.3.4, 7.2.2, 7.4.5 and 7.5; Table 7-1) show that an important barrier to usage from work is lack of time, and the related issue of workload. In ASM, while the doctors find themselves in a technological world offering solutions to many of the problems, there is a contradiction between the value of the Internet versus the time required to utilise it. The doctors simply do not have the time required to perform the work that is demanded by the information age. This finding is in line with the findings in the international literature review, and elsewhere [140; 353], which also found that time and workload were the greatest factors discouraging doctors' use of the Internet. This issue of time reinforces the view that even where the instrument *does* exist in a usable format, if it does not meet Rogers' criterion of compatibility with the current practices, then it cannot be effectively utilised.

#### 8.2.5.2 Expertise

Almost equally as important (and, for the non-users, more important), is the lack of expertise (Tables 7-1 and 7-2). In DoI terminology, there is a complexity in the instrument (real or perceived) that is preventing its adoption; this, in turn, means that the tool is not compatible with the doctors' current skill set, and so the relative advantage of the tool is not clear.  This problem was found in the international review and in studies not included in that review [53; 58].  In common with many professions, doctors' IT skills appear to be largely self-taught [362-367], and the results in this study (e.g. Section 7.2.1) have shown self-teaching to be only marginally successful at ensuring that doctors have the expertise they required.  In addition, this lack of expertise would likely mean more time required to perform basic Internet tasks, and therefore cause an increased waste of time.  It is also reasonable to assume that this lack of expertise with the instrument, particularly as it relates to the practice of medicine, reduces overall interest in the instrument.

#### 8.2.5.3 Organisational access to the connectivity

As shown in the results (Sections 6.5.1.2, 6.5.1.3, 6.5.3.3, 7.2.3; Table 7-1), access to the Internet by the organisation is only the first part of the physical access requirements.  In many instances, there is connectivity, but it is not available to the doctors.  This is usually because of space and logistics.  In other cases, it is because the Internet is still viewed as a distraction by organisations, and so doctors are discouraged from using it.  This is a problem that is found in other countries, even in those with good infrastructure [368].  Again, in DoI terminology, this is an issue of compatibility: the use of the instrument's being frequently perceived as unnecessary, and so not compatible with currently required medical practices, and so the subject is denied access to the instruments in the workplace.

#### 8.2.5.4 Sociological factors

Following the trend that younger doctors are using the Internet more than their older colleagues (Sections 6.5.3.1, 6.6.2.1, 6.7.2.1, 7.2), home usage is also greater for the younger doctors. In many instances, however, and in line with DoI's predictions, differences in usage amongst different age groups are being eroded, although differences still exist.

While there are differences between the genders (Sections 6.5.3.2, 6.6.2.2 and 6.7.2.2), in line with DoI's predictions, these are not always vast. A complicating sociological feature, in which women are home carers, appears to contribute to their spending more time at home on the Internet than men do, in spite of the fact that men use the Internet more frequently than women.

It is apparent, then, that doctors, especially the young and female, have found home Internet usage compatible with their after-hours activities. Although DoI predicts that variations in usage amongst demographic groups will tend towards equalization, whether or not the current sociological structures that exist in South Africa will restrain this, remains to be seen.

#### 8.2.5.5 Cost

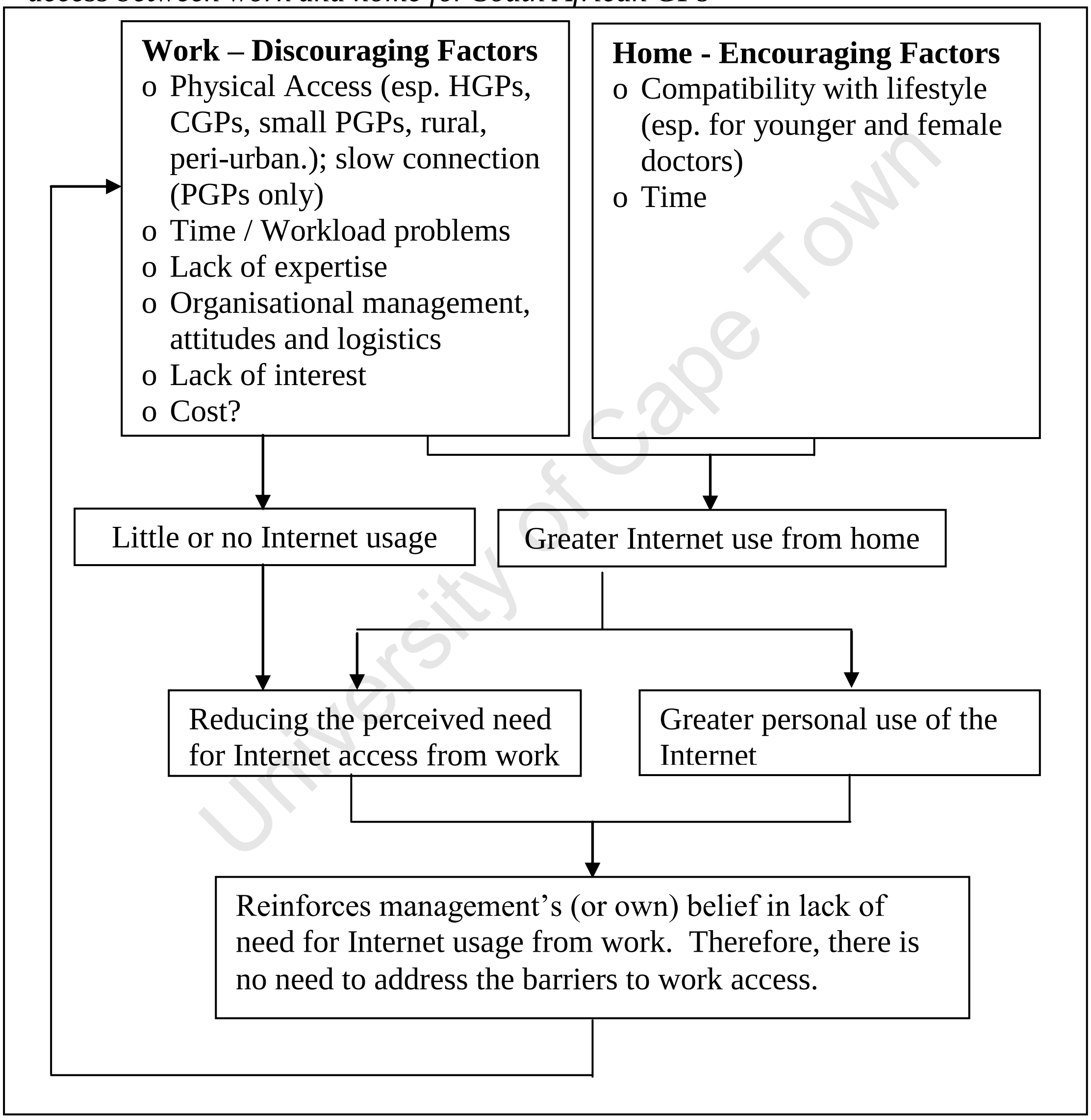
The issue of connectivity cost was raised by some doctors, but it was raised primarily in the use of email by doctors with patients. Because of this, and that email with patients it used almost exclusively by PGPs, it is difficult make definitive statements about cost. That does not mean that it is not an issue. In general, the high cost of Internet access in South Africa (some four times higher than the USA [314]), is well known. This is especially true with broadband connectivity, largely because of "an ineffective telecoms [telecommunications] liberalisation effort" [358], although costs are decreasing [315]. These cost factors would most likely also impact on larger organisations, such as hospitals and clinics, and so the impact of cost can be determined only by studying this at an administrative level, and not only at the level at which HGPs and CGPs operate. This needs to be investigated further.

### 8.2.6 A model of overall usage patterns

Drawing conclusions from these comments, although SA's GPs *are* using the Internet from work, in terms of DoI, there are accessibility and compatibility issues that lead many to use it from home. In the light of ASM, this new instrument has been introduced, has caused the contradiction, but the contradiction is not being totally resolved in the workplace. The doctors have attempted to resolve the contradiction by using the Internet from home. Ironically, however, by doing so, they have become their own worst enemies, and are perpetuating the cycle. Firstly, they have taken more work home, thereby lessening the pressure for access at work. Secondly, although more will be said about activities later, it appears that the compatibility with the home environment encourages personal usage of the Internet at home. This, in turn, reinforces the belief that the main aim of doctors' usage is for personal activities, which in turn will discourage all forms of access from work.

This process then, provides the mechanism that forms the contradictions, and which is resolved by increased professional usage from the doctors' home.  A model of usage patterns, barriers and access from work and home, as depicted in Figure 8-1, can show the interplay amongst the various factors affecting usage.

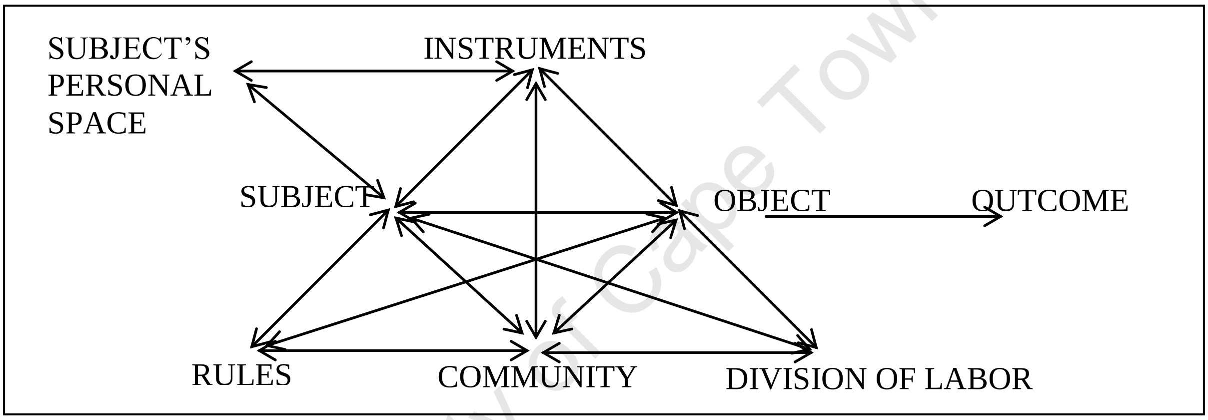
*Figure 8-1: The interplay amongst the factors affecting the distribution of Internet access between work and home for South African GPs*






From the discussion so far, while DoI has correctly predicted the SA GPs' overall usage of the Internet, localised inconsistencies in practice have emerged.  In an attempt to counter these, the doctors use the instrument from home. Engeström's ASM, needs to be modified slightly to take this into account. While there *has* been a move from the current activity, across the zone of proximal development to an expanded activity, this activity has been expanded by the introduction of a new component, rather than by adjusting current activities. The new component is use of the new professional instrument conducted in the subject's personal space. Figure 3-2 needs a modification, and this modification for home usage is shown in Figure 8-2.

*Figure 8-2: The expanded activity that requires a new component into the activity model*






In summary, in spite of the technological and sociological variability of South Africa, DoI accurately predicts the general usage patterns amongst SA GPs. With reference to the predictions in Section 5.5, this section indicates the SA GPs access is far higher than the national norm, that the curve of the uptake resembles that shown in DoI (Figure 3-8), that, although physical infrastructure plays a crucial role in usage, a lack of physical connectivity is not the most important obstacles to usage, as problems of time, workload and other factors are more important barriers. In addition, ASM correctly describes this pattern in the workplace, but a modification is needed in order to explicitly indicate the high home usage of the professional instrument.

## 8.3 The five areas of study in relation to the theories

Thus far, the research questions have been addressed in general terms only. In the background to this study, five specific study areas in Primary Care were introduced, and formed the scaffold for the presentation of the data. Following that pattern, the study areas will continue this scaffolding role in this discussion so that the two research question may be answered in more detail.

### 8.3.1 Information needs

The international review indicated that, apart from the use of the Internet for email, doctors elsewhere concentrate on the Internet as a source of medical information. Because of the international homophilous nature of the doctors, DoI predicts that this should also be the case in South Africa. As discussed above (Section 6.14), the large usage from home will mean a higher use of personal activity on the Internet. In addition to personal usage, 54.8% of the total sample access online journals, 46.0% search for drug information, and 43.2% search for patient-specific information.

Although formal CME and gathering of patient specific-information are usually separate activities, in Section 2.3.1.1, CME is given as “any and all the ways by which doctors learn after formal completion of their training” [32]. In that discussion, it was pointed out that informal CME has a great impact on learning, and is strongly personally-motivated (usually because of patient-specific needs [53; 55; 58; 61]), and so the lines between the two activities are blurred.

This concentration on the Internet as a source of medical information has also been found in studies beyond the review [47; 369-376]. Just as online education in general has risen dramatically over the past decade [377], so CME providers have recognised the need for CME online. They are increasingly offering full or partial course material online, with the impact equivalent to or greater than traditional, face-to-face CME [33; 330; 371; 374; 375; 378-390].

Of course, internationally, the use of the Internet for information starts earlier, when doctors are still students. Most medical students in the world use the Internet for accessing teaching materials [29; 329; 370; 391-395]. This is usually in an online Learning Management System (LMS), but a great number of the articles are sourced directly from the online journals and other web pages. Similarly, this practice is also found in South African universities [396; 397]. Most of the skills required for accessing this information, and most of the information sources are exactly the skills and sources that these students will require when they practice as doctors.

Internationally, the problems that doctors face in accessing traditional CME materials override many of the obstacles of Internet infrastructure, and so many prefer accessing their CME online [53-55; 58; 59; 66; 69; 398; 399]. This result is echoed only partially by the results of the SA GPs behaviour, but, as seen, this is also because of obstacles other than the Internet infrastructure.

Nevertheless, those SA GPs who *do* use the Internet for CME, do so for reasons similar to their international colleagues. The emphasis of CME as personally-motivated, usually because of patient-specific needs and frequently requiring an immediate response to a specific problem [26; 53; 55; 58-62], is echoed by the SA GPs (Sections 6.9.2 and 6.9.3). They interact with the Internet by searching for medical information, sometimes driven by their own curiosity, but usually strongly driven by specific patient's needs, with the aim of improving overall knowledge and managing diseases.

In Chapter 2, it was shown that doctors frequently reach for information most easily accessible even if it is not the most recent [62; 63], often relying on personal libraries [58; 62]. Having access to the Internet from the point of care, especially through mobile devices, increases access to information immediately needed, and has direct benefits for the patient care [317; 400; 401]. The GPs in this study have found that, with the advent of the Internet, they have a personal library that is at hand *and* current.

In ASM, the Internet is reinforced as an important instrument in the scheme, supplying a required service to the doctor (subject) by supplying information from the broader medical community, based on the needs of the patient (object) with the health of the patient as the desired outcome.

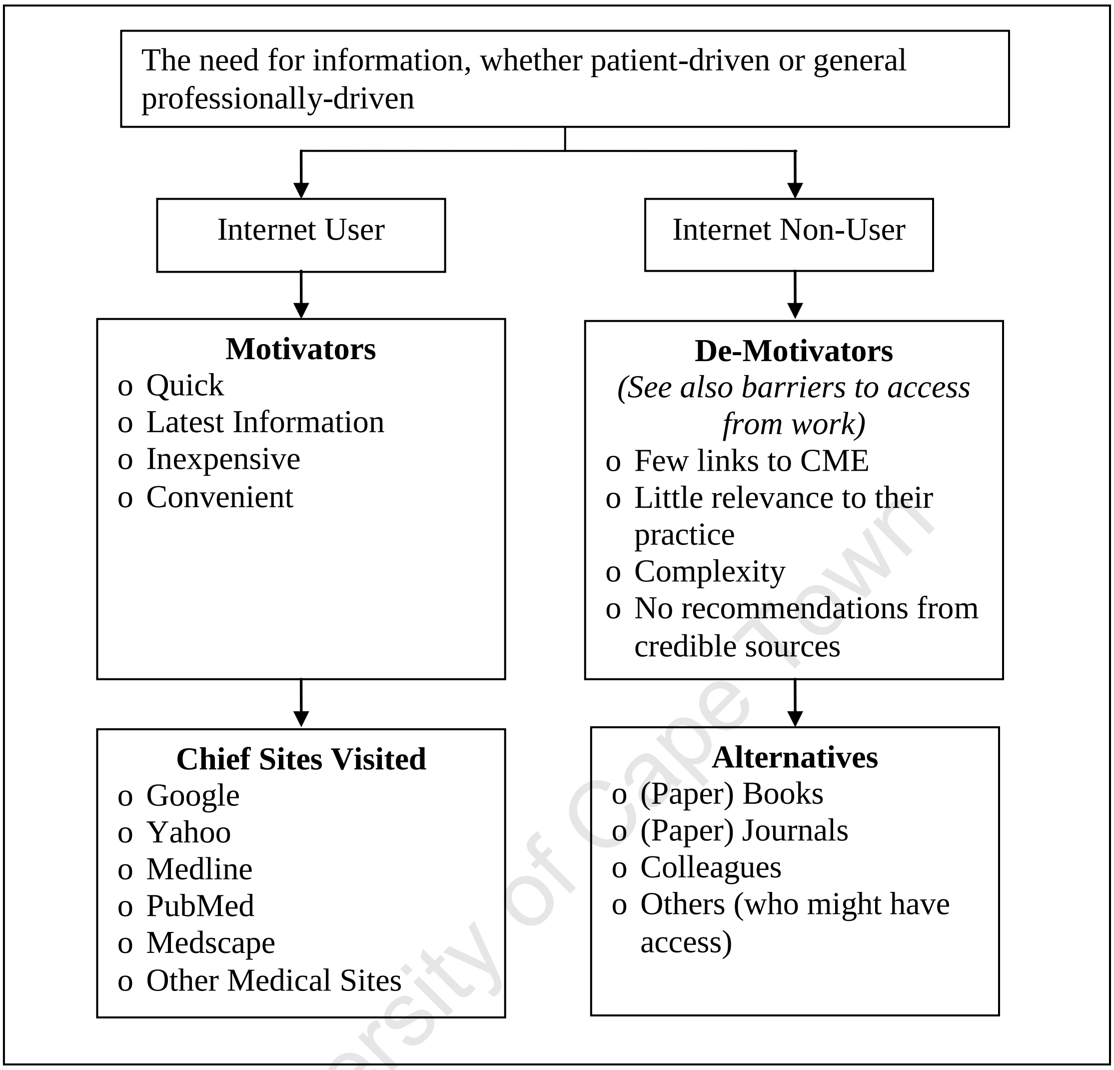
In DoI terminology, the SA GPs have indicated that the perceived relative advantage of searching for information on the Internet is the speed of retrieval (e.g. Sections 6.9.2 and 6.10), access to the latest information (e.g. Sections 6.9.1, 6.9.3 and 7.3.1), reduction of expense (e.g. Section 6.9.3), and convenience (Section 6.9.2). (See also Table 6-14.) These advantages are crucial the GPs' healthcare delivery, and so are demonstrably compatible with the GPs' CME and other research activities.

Although 73.1% of the non-users indicated that they could be motivated to use the Internet (Table 7-2), possible motivations varied widely. Amongst these non-users, it appears that Rogers' positive characteristics of the innovation are over-ridden by the negative criteria. These doctors do not see the relative advantage of the Internet; for instance, they desire more links to CME materials and for information directly relevant to their practice. In addition, they do not have experience with observing its value and they need more recommendations from credible sources, they perceive and have experienced complexity, and have indicated a need for training. There are also some who say that they have no interest, and that nothing will motivate them to use the Internet.

The listed characteristics indicate that the non-users cannot (or have no desire to) place the instrument into Engeström's model, and that, because they perceive it to lack DoI's compatibility with their working environment, do not see a reason to use it. The large number of doctors who *do* find these needs met indicates that the non-users are either incorrect, or, are working under such specific circumstances that their needs cannot be addressed by the Internet. The non-users attempt to address these needs by finding information from elsewhere, such as from paper journals, books, colleagues and others, who may or may not access the Internet.

In diagrammatical form, the different approaches are shown in Figure 8-3 below.

*Figure 8-3: Meeting Professional needs for information – the processes followed by Internet users and non-users*






In the previous section describing the doctors' use of the Internet from home, ASM was adapted to take into account the fact that the subjects are using the professional instrument in their personal space on such a large scale. This was the result of the current activity moving across the zone of proximal development to the new expanded activity. Engeström, however, also deals with the alternative, contracted activity. In this instance, it concerns those doctors who do not use the instrument at all. Some of the non-users in this study would perceive that their activity is simply a copy of past practices. Most (73.1%), however, would be willing to use the Internet if the barriers were removed, indicating a recognition of the shortcomings of their current methods of operation, and echoing a concern of one of the participants that non-access is a "serious problem."

As was established in Chapter 2, and is recognised by the doctors in this survey (Sections 7.3.1 and 7.3.2), with medical information becoming quickly outdated, good quality service delivery relies on doctors' staying current with medical practice and knowledge, and a large amount of this knowledge is to be found in published journal articles. As was discussed in the ASM model, the contracted activity is not merely business-as-usual: the Internet is changing the way in which the medical fraternity accesses information, and accessing information through the Internet is already the new standard. In an international trend that began some 20 years ago [402-404], many libraries (including those in Africa) are cancelling print-only journals while increasing their number of electronic-only journals and databases, and, where the journal is available in both formats, the print versions are being cancelled to the point that more journals are now available electronically than in print [405-410]. In addition, with currently more than 4 000 open-access journals online, and many major print medical journals (e.g. *British Medical Journal*, *New England Journal of Medicine*) having online open-access programmes, the free online resources are continually expanding.

Today, we may take the online publication of journal articles for granted, yet it was merely 12 years ago that the Editor-in-Chief of *Chest* was asking seemingly unanswerable questions (regarding fees, advertising, copyright, etc) as his journal considered the "experiment" with online publication [411]. Today, *Chest* is one of the many journals that pre-publishes articles online, even before editing or proof-reading [412]. Such is the speed with which online publication has progressed. In a field where quick and convenient access to the most recent information could mean the difference between life and death, or even just the easing of suffering, such is the advantage offered to the doctor who has access to the Internet.

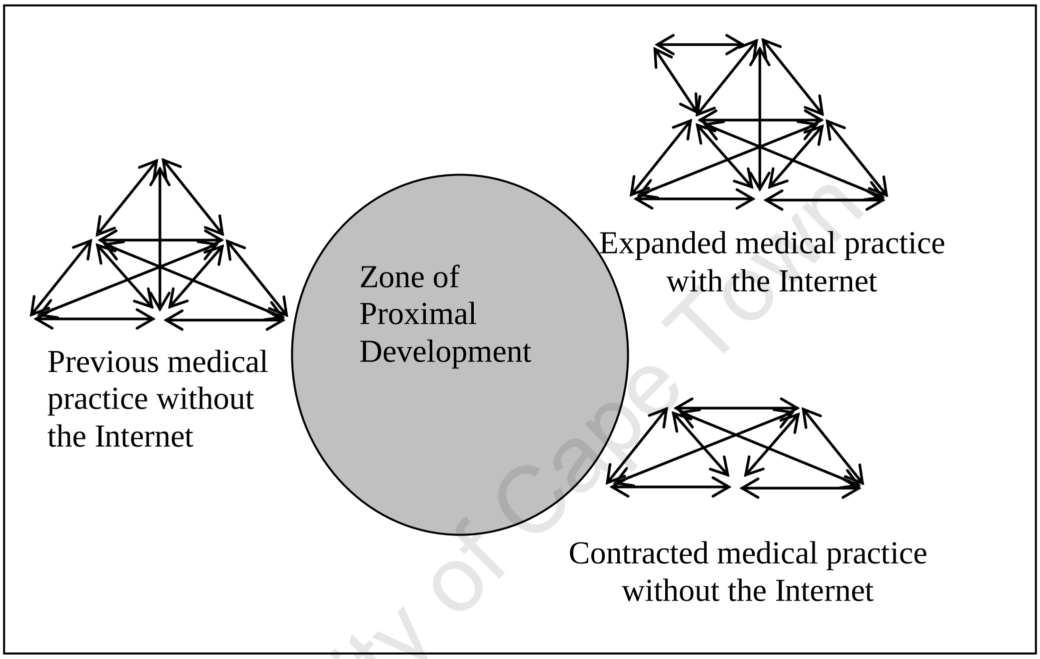
On a more technologically-sophisticated level, hundreds of public and academic libraries and library organisations have opened virtual environments (or "Library 3.0") [413], containing material and services unavailable in print form and physical libraries [414-419]. Recent developments in the field of Virtual Research Environments (VREs) [420] are set to continue this trend, and these VREs are quickly being taken up in the medical research fields [421; 422].



The implications are clear: in the information age, non-use of the Internet does not mean simply accessing required services through old methods; in many instances, it means not accessing the material *at all*, or having no access to new material. (Accessing old material is no substitute, as, frequently, that information is no longer valid). As this material is a requirement for good quality health care, not having access to it will impact negatively on the quality of the health care offered.

In addition, the non-existence of the link between subject and instrument affects other links, and all links to and from the instrument are broken. Figure 3-7 presented a diagram showing the unknown possible expanded and contracted activities after the introduction of the Internet as unknowns. Figure 8-4 below now begins the process of completing the picture. The expanded activity indicates the inclusion of home use of the instrument. The contracted activity indicates a removal of the instrument, and the resultant break in access to online facilities such as email with colleagues and patients, online journals, medical web sites, etc.

*Figure 8-4: The two possible scenarios dependent upon whether or not the doctor uses the Internet.*




As has been pointed out earlier, use and non-use are not absolutes. Given the trends of growing Internet usage, in some cases, the contracted scenario is likely to evolve into the expanded scenario, or at least a partial variant of it. This is especially true of the 73% who would be motivated to use the Internet.

With respect to information needs, DoI has correctly predicted the concentration and motivations of SA GPs using the Internet as an information source, although it appears that the problems of accessing online CME are still too great for this aspect to be fully utilised. The implications from DoI are that, as international medical access to information changes, so too does the SA doctors' access to this information. The crucial aspect is not merely that SA doctors are still accessing information, but rather that their *methods* of accessing the information, in line with international practice, have changed. It is this change that is described by ASM, showing the move of these doctors across the zone to the expanded model. But ASM goes further: it also describes the impact of non use, which results in the contracted model with broken links, indicating that the new sources of information are not available, from either work or home, and the impact that this has on the delivery of health care.

### 8.3.2 Communication with colleagues

Similar to searching for information on the Web, ASM describes communication with colleagues through the Internet as the subject interacting with the community by means of the instrument. The level of communication with colleagues was similar to the level of communication with patients. From Tables 5-4, 5-9 and 6-10, the figures for the SA GPs' use of the Internet for communication with colleagues is significantly greater than the mean of International usage figures, and falls in the high end of the minimum and maximum range. These high figures need to be probed more deeply.



One of the greatest relative advantage drivers in the use of email for communication with colleagues appears to be the value of asynchronicity in a profession where time is not easily available, where the GP does not wish to interrupt a colleagues' delivery of health care, and where many doctors access their email from home. This is similar to the international motivation. (Of course, the colleague may wish to treat the email as semi-synchronous communication, by receiving pop-ups on the computer, or announcements through a portable device, and then responding to those emails. That, however, is the colleague's personal choice).

In addition, because of South Africa's relative isolation from the rest of the world, there is the facility to communicate with international colleagues, especially when asking for assistance from the experts, or "educationally influential" doctors. This is emphasised where the GP is dealing with an unfamiliar condition. Added to this, from the comments in the results, it is apparent that much of the communication with colleagues is informal CME. This enables the requirements of the communication with the community, as described by ASM, to more easily meet the requirement of compatibility as described by DoI.

It is not envisaged that email between colleagues will replace face-to-face communication. Where doctors are in close proximity, face-to-face meeting is still preferred. For doctors working in an isolated environment (e.g. rural or sole-practice), electronic communication replaces the situation in which there is no communication at all. Although telephones are useful, long-distance calls are expensive, and the person sought might not be available at the time.

There is an important difference between accessing information on the Internet and communication with colleagues: interaction with colleagues via the Internet requires the colleagues to use the Internet also. As a result, while accessing information requires only that the subject have access to the Internet, the value (or relative advantage) of interaction with colleagues requires high levels of diffusion amongst many doctors, including other SA GPs.

In summary, the factors of asynchronicity, isolation, patient-specific queries and unfamiliarity with a medical condition are the prime motivations for communication with colleagues. Diffusion of the Internet amongst colleagues is the prime barrier preventing communication via the Internet. These factors and details are detailed in Table 8-1 below.

*Table 8-1: Factors affecting the use of the Internet for communication with colleagues*

| **Factors for Motivation** | **Detail** |
|---|---|
| Isolation | Rural and peri-urban GPs |
| | GPs in small practices |
| | South Africa's isolation from the world |
| Timing of asynchronicity | Asynchronous communication means increased accessibility, especially to international colleagues. |
| | Less disruption to colleague |
| | Can be performed from home |
| Patient-specific queries | Unlike text from journals, answer is in direct response to specific problem, usually a patient-specific issue. |
| Unfamiliarity | If the GP is unfamiliar with a condition, either because it is rare or rare in SA, this allows consulting with an expert, or at least someone more familiar. |
| | |
| **Factors as Barrier (see also other barriers above)** | **Detail** |
| Diffusion | Internet usage must have diffused to colleagues |



DoI has correctly predicted the trend that SA GPs would use Internet for communication with colleagues, but the level of usage was significantly greater than the mean of the international figures, although email communication was within the minimum and maximum limits (Table 5-4). The motivating factors are mainly issues of relative advantage to the doctor. The isolation described, and the lack of access to formal CME materials appears to be the chief motivating factor placing this usage at the high end of the scale: these problems are being countered by increasing access to colleagues for information.  While this is reasonable short-term solution, there is a risk that this places an unfair burden on these accessed colleagues, who find themselves meeting the needs that should have been met by CME.

Finally, it appears that the need for both the use of the instrument by the subject, and the diffusion of the instrument amongst colleagues is a factor not taken entirely into account by either DoI or ASM.  As Figure 8-4 indicates, if the subject is not using the instrument, then communication with colleagues via the instrument is broken. Simultaneously, even if the subject *is* using the instrument, if it has not diffused amongst colleagues, then that link is also broken.

### 8.3.3 Communication with patients

In ASM, email is the instrument through which communication between doctor and patient can occur.  In line with the predictions based on DoI, the percentage of doctors who use email with patients is high compared to the percentage of patients with whom they use email (Table 6-10; Section 6.11).

While this is a useful overall description, it is a starting point only.  It is necessary to know whether or not these figures will change.  In contrast to the use of email with colleagues, both the international review and this study have indicated that email with patients is a contentious issue.  As a result, it is necessary to know the underlying motivators for and obstacles to email with patients, and then consider the extent to which DoI predicts these will impact on future email communication between doctor and patient.

#### 8.3.3.1 A patient-driven activity

The internationally low figures for use of email with patients, as given in the literature review (Tables 5-4 and 5-9), appear to be a lack of response by doctors in meeting patients' requests for email communication [129]. Given the low Internet diffusion rate amongst patients in South Africa (compared to the diffusion amongst the population in the countries in the international review), and yet the comparable figures for email communication with patients in the literature review, it appears that SA doctors' response rate to patient demand is significantly higher than that of their international colleagues.

This high response rate is crucial to understanding the possible future of email between GPs and patients in SA, because the strongest driver of using and increasing email with patients is patient-demand, and there is nothing to indicate that this demand will be reduced in the future. On the contrary, from the patient's side, this sense of increased availability (and response from doctors) increases patient satisfaction (as reported by 52.7% of the GPs who use it), and this is likely to increase the demand for it [423]. This demand is further reflected in the results, where some 68% of the email communication is initiated by patients, and 67.3% of the GPs using email with patients do so to answer questions about disease management. (The SA sociological context is addressed in Section 8.3.3.2 below).

In terms of ASM, there is a slight change in the model. Although the doctor remains the subject, some control of initiating the contact is passed to the patient. Of course, for the most part, patients always have been the initiator of the contact, the consultation. Until now, however, the doctor has had more control over availability. Although Table 6-10 indicated that there was great personal choice in the doctors' decision to use email with patients, this is not an entirely one-sided decision. With 49.4% of doctors acknowledging that their availability is increased by email, and 68% of patient-doctor email initiated by patients, this indicates a change in which the object has assumed a greater authority. The implications of this for ASM will be developed further in the following sections.

#### 8.3.3.2 Increasing diffusion

There is a second driver that indicates that demand will increase, and dramatically so. That is the *diffusion* of the technology amongst the patients. It is true that a small percentage of doctors are using email with only a small percentage of patients. It is also true that only a small percentage (approximately 10-12%) of South Africans have access to email. The effect is especially noticeable in the low rate of email communication with patients in rural and peri-urban areas.



The figures in the literature have also shown, however, that the diffusion of the Internet in South Africa is not static, and is growing [206; 314; 315]. The percentage increase from 2003-2005 translates into some 350,000 to 400,000 new SA Internet users per year. With the signing of the new West Africa Cable System (WACS) agreement, and bandwidth to South Africa set to increase 100-fold by 2011, current indicators are that this trend will continue for at least the next five years [424]. Although, as described by DoI, the new innovation has spread first amongst the high socio-economic groups, these numbers indicate an advancement. In addition, features such as the small but growing spread of Internet Cafés and Microsoft's "Digital Villages" in the poorer areas like Orlando, Orange Farm, Mbombela, Engcobo, Tembisa and Khayelitsha [425-427] all contribute to the diffusion of the Internet across South Africa's general population. Given this information, and the fact that email with patients is so strongly patient-driven, as the use of the Internet diffuses amongst the general population, it is reasonable to assume that patients' demand for email communication with doctors will increase with it.

Because this has been a study of doctors, we have only the doctors' perceptions of advantages to patients. One would need to know the extent to which these advantages are major drivers, and also the impact of other possible variables, such as the patient's ability to gloss medical terminology in their own time, or to have a written record of instructions from the doctors. In addition, the impact of sociological developments in rural and peri-urban areas needs to be assessed. This can be determined only via a patient study which would be an area of further research.



#### 8.3.3.3 Advantages to doctors

Although it is patient-driven, in DoI terms, and similar to the reports from the literature review, the results indicate that the use of email with patients offers doctors a great relative advantage.

Firstly, the waste of their most precious resource, time, is reduced: more than two thirds of the GPs who use email with patients report that time is saved on answering simple questions, and half report that it saves time on telephone calls (Table 6-13), as has been found elsewhere [340; 428]. It is not only the *time* of the telephone calls that is saved, but, as other studies have found, the use of email can go a long way to overcoming the problems of disruption caused by synchronous communication [75].

Secondly, there is a realisation that overall communication quality with patients is increased. The doctors report the value of having time to reflect on their responses and insights, and consult resources before communicating with their patients. This appeared to be of particular value with patients with chronic conditions. While some might be wary of an email dialogue, email can be, and has been, used as an effective method of sending basic patient education materials [84].

Maintaining the communication channels over a length of time would surely go some way to meeting an important goal of primary medicine mentioned in the Introduction, in which: "the continuum of care is the patient, the episode is the disease" [24].

Thirdly, assuming that patient satisfaction is important to the doctor, this factor is also seen as an advantage by the doctor.

Finally, 44.5% of users of email with patients report that it improves overall efficiency, 43.6% that it saves money (presumably through the saving of time), and only 29.1% report that it increases workload (Table 6-13).

#### 8.3.3.4 Motivations to *increasing* usage

After demand from patients, for doctors who are already using email with patients, the main motivation to *increase* usage was a reduction of workload and an increase in available time (Table 6-14). In DoI terminology, the relative advantage of email with patients emphasises the need to alter circumstances in the doctors' environment so that the processes of email communication with patients is compatible with daily functions.

#### 8.3.3.5 Barriers to overcome

There are significant barriers to overcome, and these affect mainly those GPs who do *not* use email with patients.

The first barrier is the fear that email may increase the doctor's already great workload, and it may intrude on the doctor's private life (Section 7.4.2). As noted by the doctors, with the increased demand, will be an increased, and unreasonable, expectation of quick responses. These extra demands will make the use of email incompatible with the doctors' work practices, and will introduce further contradictions into ASM.

The second barrier is the fear that email communication will replace face-to-face consultations, and become, in effect, online consultations. In keeping with international studies [73], the SA GPs also fear that this will have a direct impact on the quality of consultations, especially because of patients' misunderstanding the information, and not asking for clarity. The use of writing as a means of communicating with other doctors has long been crucial [73]. The use of writing as a means of communicating with patients is new to many doctors, and is a skill that will need to be developed in order to reduce misunderstandings.

Thirdly, there is the issue of charging. Although only 16.5% of the doctors who did not use email with patients said that lack of reimbursement was a reason, reimbursement was listed by 49.2% (in 5$^{th}$ place) as a motivator that would lead to doctors' increasing email with patients. If patients are not to be charged for what may become email consultations (or 'eVisits' [429]), the doctors will suffer financially. As Engeström notes, not only is the patient a person "to be helped and healed," but the patient is also a "source of revenue and profit" [9]. Internationally, the response from patients to the issue of charging has been mixed [430-433], and this is an area that will require investigation in South Africa.

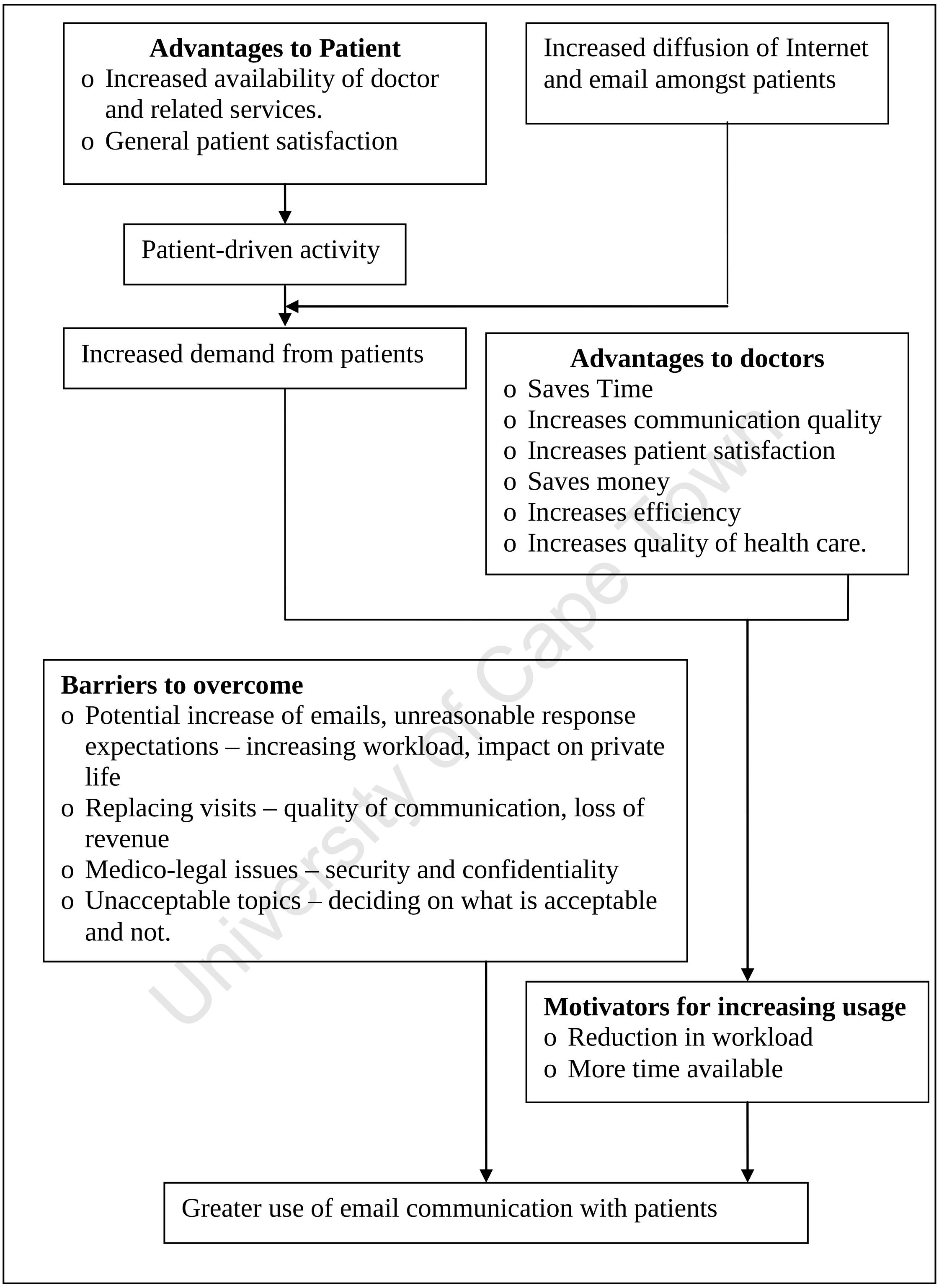
The fourth set of barriers is medico-legal issues of security and confidentiality. SA GPs recognise that patients' points of access might not be secure, and that non-encrypted email is inherently not secure. Security and confidentiality is a recognised international concern [84; 142], and are also reflected as an issues in the literature review (Tables 5-6 and 5-10).

Finally, there is the issue of acceptable topics. For the most part, SA GPs are in agreement that standard administrative tasks such as scheduling and cancelling appointments, and billing and account queries can be performed via email. As a result, email has a high degree of acceptability for these activities. Even with these functions, as they often contain details of a patients' condition, issues of security and confidentiality may arise. The grey area emerges on issues of diagnosis and other medical functions, although the percentage of doctors using email to answer questions on disease management indicates that many of them are managing the email process.

### 8.3.3.6 A model of usage

A description of these factors affecting email communication with patients can be best described in Figure 8-5 below.

*Figure 8-5: The processes and mechanisms determining the development of email communication between doctors and patients*




While DoI correctly predicts the overall figures of email usage with patients by doctors (Section 5.5), it warns against possible incompatibility that will result from the growing Internet diffusion amongst patients, and ASM warns about the growing contradictions that may be created. These contradictions need to be resolved.

The importance of email goes far further than merely overcoming barriers. In both Chapter 2 and Chapter 3, it was noted that there has been an evolution of the patient's role as pure object, to object with a "voice," [12]. In one of his examples, Engeström refers to patients asking for laboratory tests [9]. In this discussion of email between doctors and patients, it is obvious that the position of the patient is changing, and that this is part of a further-developing contradiction in what Engeström sees as "patients demanding technological medicine" [9]. Until now, although the patient has demanded technology, the doctor has acquired, owned and controlled that technology. With email, not only are patients demanding the new technology, but they are *using* it and taking some control over it. Far from the usual minor contradictions noted by Engeström, manifested "through disturbances, ruptures and small unremarkable innovations in practitioners' everyday work actions" [9], this change is dramatic, and promises to bring about significant implications for doctors and the patient-doctor relationship.



To evaluate this properly, this discussion needs to be seen in the light of the changing role of the patient from object to the Patient as Partner.

### 8.3.4 Patients as partners

In the previous section, note was made of the fact that the direct usage of email as an instrument through which the patient and doctors communicate is altering the patient-doctor relationship. This technological development is, moreover, happening in parallel with two other developments.

#### 8.3.4.1 The patient as a source of information

The first of these developments is the fact that the patient also has access to the Internet as a source of information. Just as the doctor can access CME sites and journal articles on the Internet, so, too, can the patient. In fact, so too, *does* the patient. Similar to many parts of the world, the South African "e-patient" [434] has arrived. In the absence of guidance from the doctors and even hospitals [116], patients are seeking their own information, increasingly from the Internet, and bringing this information into the consulting room [114; 130; 131; 133; 142; 147; 181; 285; 434; 435]. This is more pronounced in patients suffering from chronic conditions [436], and so will have an impact on the long-term patient-doctor relationship. This is especially so because chronic conditions are on the increase worldwide (including South Africa), and are not confined to the affluent [23; 169; 437-442].



Although patients are becoming more informed, the doctors have no control over the information accessed. The SA GPs' fears' of patients accessing information from journals and sites of reputable institutions primarily raise issues of complexity, rather than issues of accuracy. In addition, however, there is a wide range of discussion boards and information sites run almost exclusively by patients (e.g. PatientsLikeMe [443]), or other non-qualified persons, and the GPs were also concerned about the quality of this material. These concerns are international concerns also, and many studies have attempted evaluations of the information quality in a range of medical areas [444-446].

General search engines (such as Google and Yahoo) tend to favour general sites with variable results, especially in complex cases [447; 448], and the problem is exacerbated by the fact that individual patients have to pay to access many high-quality journals online, and so, rather than pay, they are inadvertently encouraged to access a range of arbitrary sites. Even the WHO Project "Health InterNetwork Access to Research Initiative" (HINARI), which encourages inexpensive access to biomedical journals, "does not accept registrations from individuals, but only from institutions," and does not accept membership from South Africa [449].

In addition, and echoing the international research listed in Section 2.3.4.2, the GPs in this study have expressed grave concern at patients' not being able to understand and correctly interpret the material, even if it is correct.

Further, not enough is known about patients' who seek information and who *do not* bring it to the consulting room, but who might act upon it. While there is a strong correlation between the number of doctor recommendations and the percentage of patients bringing information, there are also patients who *do* bring material to doctors who *do not* recommend sites. It is also reasonable to suspect, as has been found in other international studies [130; 327; 450; 451], that many patients are not sharing their information simply because they have not been asked. It is likely that simply discouraging patients from seeking information on the Internet will not reduce such activity; it will, however, reduce the doctors' *awareness* of that activity. It will drive the patient to secretly consulting sites that are inaccurate, misleading, difficult to understand, inappropriate, and, ultimately, dangerous.

These factors given above are a strong argument for the creation of high quality patient education sites to assist patients in managing their health [83; 120; 129; 134], and patients can be directed and guided to these sites and their usage [84; 116; 135; 326; 329-331; 335; 452]. By seeking out sites for patients, doctors are able to direct them to accurate and understandable information. Already the figure of some 15.5% of SA GPs referring patients to specific sites is encouragingly close to the International figure of 24%. At the other end of the scale, is the high percentage (54.0%) of GPs who *never* recommend sites to their patients. From the statistics in the survey and the comments in the qualitative study, it is clear that a major factor in this is the number of patients who do not have access to the Internet. The process of using the Internet for patient education does, therefore, assume that the patient has access to the Internet – as seen, although this figure is increasing, it is still very low.



#### 8.3.4.2 The patient as a partner in the healing process

The second parallel development that is occurring within the practice of medicine, and has been already been described in detail, is the patient as partner. The debate over whether it is good or bad is over – as was described in Chapter 2, it is a reality [19; 23; 38; 49; 81; 109-122]. (Some patients may be reluctant to take the responsibility of the partnership, and this situation will need to be managed carefully by the doctors [122].)

Apart from the obvious danger to the patient, inaccurate or misunderstood Internet material has a direct impact on the relationship. The shift of the patient from object to object with a voice and partner in the healing process will be compromised by inaccurate or misunderstood information that this partner brings to the healing process (whether this information is divulged to the doctor or not). Rather than resulting in a partnership, it places a greater burden on the doctor who faces the extra challenge of having to correct the information [38]. By increasing the doctors' workload and extending the time of the consultation, it places greater tension on the patient-doctor relationship.

As noted, simply ignoring or discouraging patients from accessing the Internet, in an attempt to reduce the problem, will solve nothing. It will, instead, result in a different set of contradictions – a consultation in which the doctor argues with a patient who has extra information of unknown accuracy and complexity. This poses a danger to the patient.

The potential value of patient use of the Internet is profound, and the patient has recognised this. Just as the doctors have found relative advantage in the Internet, so too, have the patients, and the diffusion amongst them is increasing. For the activity in ASM to move across the zone of proximal development, the patient should be viewed as a potential researcher, having direct access to the material, having access to the doctor via electronic communication methods, and being increasingly viewed as a partner in the healing process rather than as a confrontational opponent to challenge the doctor [129; 332]. This sharing of information allows for the finding of a middle ground between the paternalistic approach and "rampant consumerism" [113].

An area in which this will prove particularly important is for child patients. Internationally, paediatricians have taken note of the potential of information technology on child patients and their parents [85; 127; 453; 454]. Global figures on Internet usage are difficult to obtain for ages below the age of 18, but those that do exist indicate that the usage for people aged 10-18 is among the highest of the age groups in general [455-460] and also in searching for medical information [461; 462]. With 93% of Americans aged 12-17 online [455], other current figures indicate that, "with few exceptions, children [aged 5-14] and youth [aged 15-24] are much more likely to use computers and the Internet than the general population" [460]. Finding medical information that is both accurate and understandable by children is needed.

There is the further possibility that, as the patient becomes more educated about the condition, especially with a patient suffering from a chronic condition, the patient may be able to move beyond patient-education sites. In Chapter 2, reference was made to the comment that "family medicine is…the field in which the amount of guilt is directly proportional to the number of unopened journals" [70]. As the qualitative comments show, there are some patients who are able to move beyond standard 'patient-education' sites, and can work with more sophisticated journals and articles. This move will raise the patient's value as partner in the healing process.

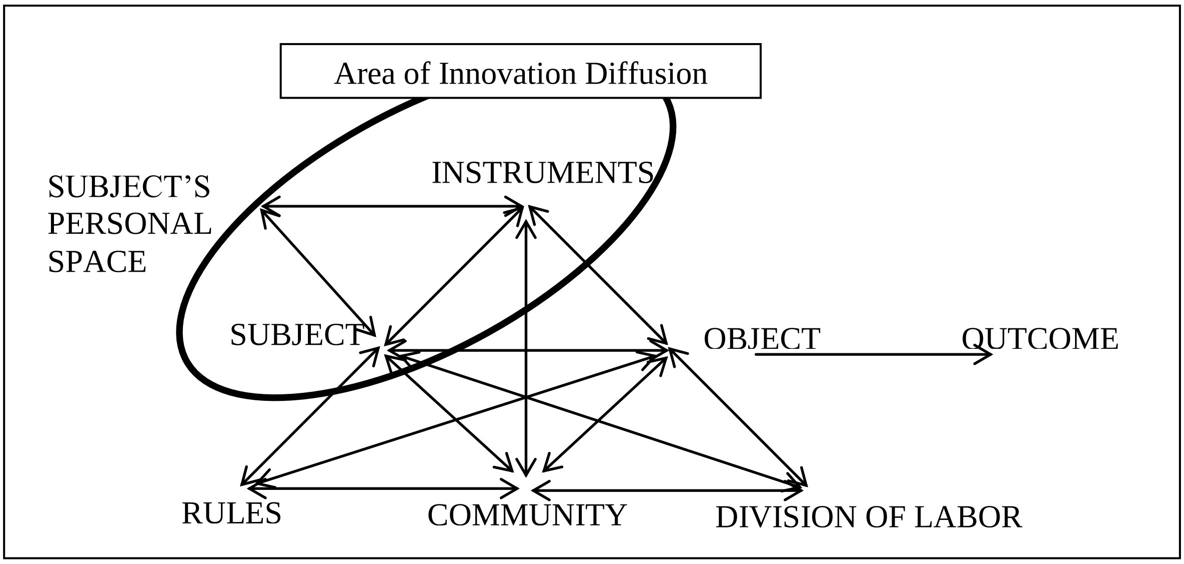
**8.3.4.3 Convergence of ASM and Diffusion of Innovation**

It is at the point of patient as partner in the information age that the implications of ASM and DoI are most noticeable.

When Engeström describes a primary contradiction in health care, he refers to the contradiction between the "patient as person to be helped and healed *versus* patient as source of revenue and profit" [9]. In the preceding discussion, there is a new primary contradiction: the patient as a passive receiver of medical treatment versus the patient as an active partner in the healing process. The patient has moved from an object with a voice to a (albeit junior) partner in the process of healing; simultaneously, however, the patient brings a wealth of previously unavailable information. The patient's role begins to include that of a "learning collaborator" [34]. The doctor's role has shifted from the absolute ruler to one who remains responsible for managing the entire process, from suitable material, to patient education and ultimate decision-making.

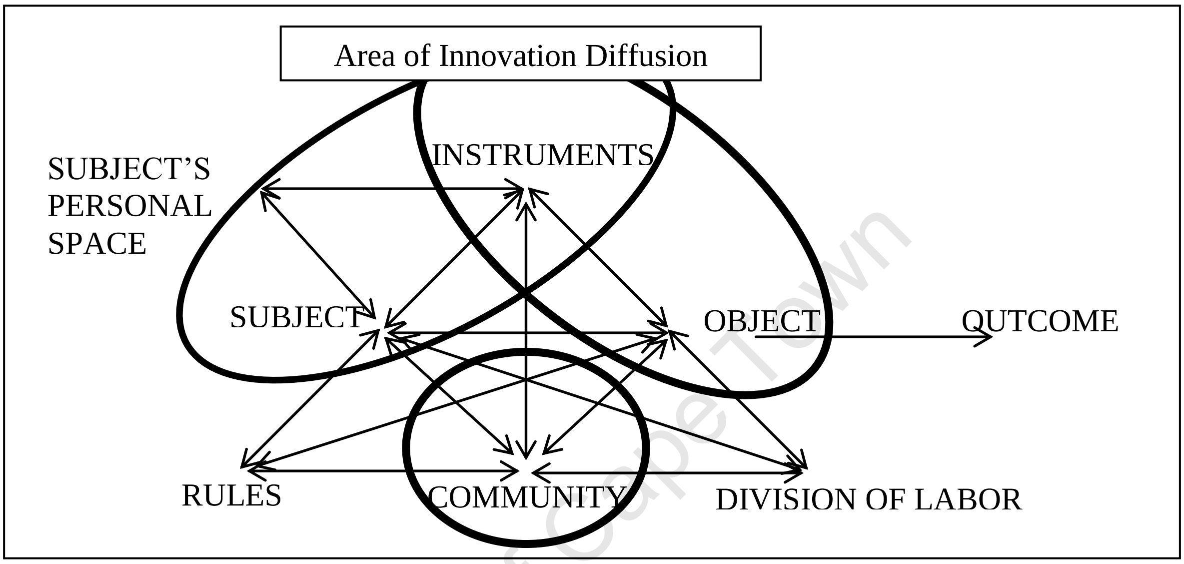
The motivation behind this change lies in the nature of the diffusion of the instrument. With other medical instruments, such as the x-ray machine, diffusion has occurred within the realms of the subject, as shown in Figure 8-6 below. Occasionally, because of cost, the instruments may be part of the medical community, and the subject utilises them as is needed. The object does not determine the usage.

*Figure 8-6: The components of ASM within the diffusion of medical instruments*



With the Internet, however, the diffusion of the instrument is occurring within the realms of the subject *and* the object. In addition, the diffusion is occurring amongst the community (as shown in Figure 8-7 below).

*Figure 8-7: The components of ASM within the diffusion of the Internet.*






In Figure 8-7, the two areas of innovation diffusion around the subject and object are equal in size. In reality, in this instance, the evidence from both the literature review and the survey indicates that the innovation diffusion is greater amongst the subject than the object. Specifically, while South African GPs appear to be well into the 'late-majority' of diffusion, the South African population is still amongst the 'early adopters.' Technological advances and the trends in the international study indicate that this adoption amongst the subjects and objects will increase.

It is necessary to ensure that the partnership works. From our results, and the discussion above, there appear to be five main variables that determine the impact of patients' bringing Internet material into the consultation as a partner. These, and the desirable characteristics, are given in Table 8-2 below:

*Table 8-2: Variables and their desired characteristics that impact on the patient-doctor relationship and the concept of patient as partner, when patients bring material from the Internet to the consultation*

| **Variable** | **Desirable Characteristics** |
|---|---|
| The quality of the material. | o The material needs to be medically accurate, preferably from reputable sites.<br>o Although it needs to be evidence-based, it also needs to be uncluttered by extraneous information.<br>o The context of the material needs to be clear, so that knowledge of influencing factors, and patient expectations, can be achieved. |
| The patient's understanding of the material | o The level of the material needs to be suitable for the specific patient, based on appropriate demographic factors, such as education levels and age. |
| Impact of inevitable self-diagnosis | o Attempts at definitive self-diagnosis need to be kept to a minimum or excluded altogether. Even if accurate, the diagnosis needs to be based on more than a simple matching of similar and self-measured symptoms. Action taken on that self-diagnosis, without consulting with the doctor, must be avoided totally. |
| Doctor's attitude towards the practice. | o An environment that is positive and encouraging, giving the patient an opportunity to investigate his or her condition with guidance from the doctor, at a pace that is suitable for the patient. |
| Patient's attitude towards the practice | o A mature response in which the patient recognises that being a partner in the process carries with it responsibilities, and that, meeting these responsibilities will take some effort. |

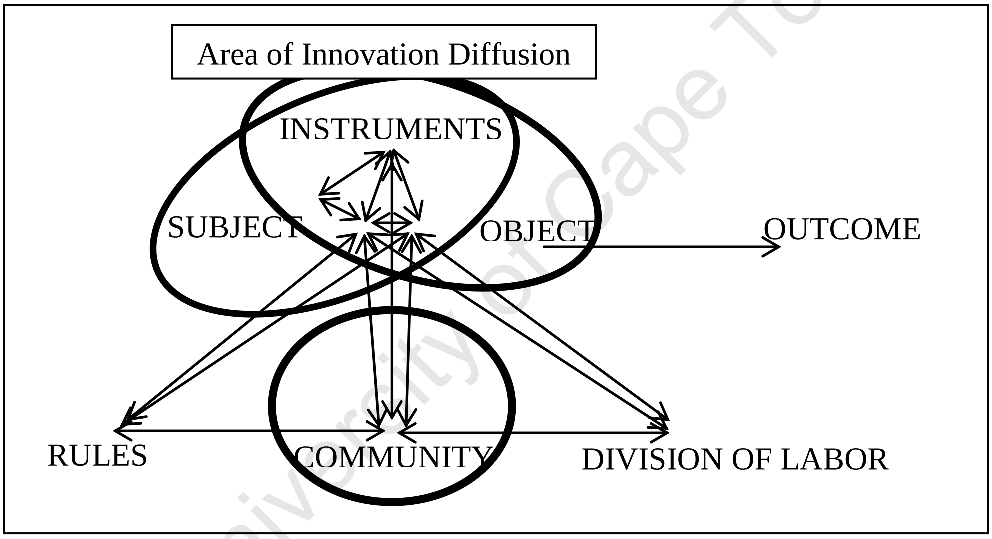


If these desirable characteristics do not exist, there is the potential that the contradictions will persist until they result in a breakdown in the consultation, and the danger of the destruction of the doctor-patient relationship is very real.

If these desirable characteristics *do* exist, they result in building a partnership between the doctor and the patient, and the model of interaction changes. A further and final refinement to the model is required. Although the evolution of the patient as partner is being encouraged by the diffusion, the patient as partner also becomes a *mechanism* for drawing the doctor and patient closer together. Both the diffusion of the Internet and the impact of the patient as partner changes the ASM diagram to indicate closer cooperation of the doctor and patient in the healing process.  Because communication with patients also occurs from the doctor's home, the subject's personal space is drawn into this close cooperation.  Indeed, there is a danger that it is no longer a separate entity, but viewed, by both the doctor and the patient, as falling within the realm of the Subject.

The new model is depicted in Figure 8-8 below.

*Figure 8-8: The components of ASM within the diffusion of the Internet, indicating also the impact of the patient as partner*






The dynamics of the consultation have changed, and there is a need to ensure that these dynamics encourage the delivery of good health care.

### 8.3.5 Practice management and administration needs

Practice management and administration covers a wide range of activities, and its variable usage across these activities in SA is predicted by DoI.  Some of the major activities will be commented on here.

The use of the Internet in private practice management, particularly in the area of online banking, appears to have evolved as an already crucial activity in the SA GP's practice of medicine. This corresponds closely with the usage describe in the international review.

In contrast, the impacting complexities of electronic medical records (EMRs) have led to their not being used by all GPs in South Africa. The literature survey did not have enough data on EMRs for a definitive statement, but there are strong developments in Europe and elsewhere for widespread use of EMRs [5; 463-466]. In the USA, the picture is less clear. In spite of their being increasingly used [5; 467; 468], and President GW Bush's vision that includes EMRs across the US by 2014 [469], the complexity and start-up costs of EMRs remain an obstacle preventing wide-spread usage, especially amongst smaller practices [5; 470-473]. A stimulus package of $20 billion recently announced by President Obama [474] to computerise all US health records within five years [475; 476], indicates that the US government is still strongly supporting the move to EMRs.



There is little doubt that EMRs may provide a more complete record of the patient, and more so for chronically ill patients, reducing errors, supporting research, (including recruitment for clinical trials), saving money, and being a method of communication among health providers, and between health providers and patients [5; 465; 466; 471; 477-482]. There is also obvious value in systems through which patients can view their own records, register their arrival [483] and even amend portions of their records [481]. From this perspective, EMRs are perfectly compatible with the doctors’ working procedures, and could be a crucial instrument in the delivery of quality health care.

This degree of openness, however, leads to a contradiction that is not yet easily resolved, and which makes the systems not entirely compatible with working procedure: even supporters of EMRs are mindful of potential legal and security problems [470; 484-486], and fragmentation of services [487].

On the other hand, electronic patient billing, more widely used in the USA [488], is not nearly so widespread in SA.  Again, this relies on the diffusion of the Internet amongst the patient population.  The lessons drawn from the discussion of email indicate that this will increase as diffusion and patent demand increases.

An issue that was raised frequently in the results of this study was the communication with medical aid and insurance schemes.  In this regard, the prime motivator appears to be the complexity of the claims processes and the use of codes (the “ICD10 codes”).  Their value appears aimed at contributing to a national database, similar to international attempts [489], but is frequently too overpowering for the doctors (Section 6.13.1).  While its use appears to have at least partially solved important problems that were hampering the doctors’ work, it still has some way to go before being easily accommodated.

The figure for the GPs’ overall usage of the Internet for filing medical aid and insurance claims (Table 6-10) was significantly higher than the international figure (Table 5-4).  One possible explanation might be the proportion of PGPs participating in this study; the demographics for the studies in the literature review are not available, but it is possible that this might be an impacting factor.

In terms of DoI, the required administration was not easily compatible with the current practices of the doctor, and adaptation to them was difficult – so much so that some doctors reverted to cash practices. Use of the Internet appears to have gone a long to allowing for the compatibility of the claims processes.

In this role, ASM also places the Internet as an important instrument in the interaction between the subject and his rules, and, if the community is taken to include medical aid and insurance schemes, then the community also.

Although patients interact to some extent with the practice administration software, they do so only as receivers of information (in the form of bills), or via indirect input of data. As a result, practice management currently does not alter the model in Figure 8-8 above.

## 8.4 Homophily as a mechanism

The previous sections have looked at the similarity of the usage patterns between the SA GPs and their international colleagues, in the light of ASM and DoI. In addition to this, DoI predicted that the mechanism behind the similarity would be that the SA GPs would see themselves as being part of the system of similar, or homophilous, individuals. Section 2.4 pointed to the strong similarity in training and needs. From the qualitative study (Section 6.15), it emerges that the single most important factor for the similar usage patterns was that doctors in SA feel themselves to be part of the medical fraternity, with the same training, interests and concerns, and financial resources. This is the very definition of homophily. Although there are bound to be specific differences in different countries, in this case, these do not appear to be enough to dramatically affect the general patterns of usage.

## 8.5 Review and answering of the first two research questions

The various factors impacting on doctors' use of the Internet have been examined in the light of the two theories. Because of the strong relationship between the two theories that has emerged from these discussions, an overview model of the processes is desired. Before that can be done, it is necessary to answer the first two research questions so that all the information can be accommodated in the new overall model.



### 8.5.1 Research Question 1: To what extent does Engeström's Activity Systems Model accommodate Internet usage by South African Primary Care doctors?

ASM is a useful starting point to understanding the usage of the Internet by South African Primary Care doctors. It indicates the lines of interaction through the Internet with a range of people, including the patient and professional colleagues. In addition, it explains how contradictions might be introduced, and how a response to these contradictions will move the system of activities across a period of uncertainty (the zone of proximal development) to either an expanded set of activities or to a contracted set of activities.

There are a few considerations, raised by the use of the Internet in Primary Care not directly taken into account by the theory. This is understandable, as these are mainly raised by the nature of the Internet. These are:

Firstly, if the practice is in an environment where the diffusion of the Internet has already occurred, then the contracted system is not merely contracted, but broken. By not using the Internet, doctors do not merely return to using old methods. Because the Internet has created a wealth of information not available at all elsewhere, and because it forms a communication channel to the other components of the system, a break in that link means a break in the system, and a potential lowering of the health care delivery. This break will not be immediately apparent, as much of what was available off-line will still be there. As more and more information moves to the online environment, and more colleagues and patients expect electronic communication, the breaks in the links will become more apparent. As a result, the value of the contracted activity will be further reduced.

Secondly, the expanded model has required the addition of a new item – the use of the Internet from the doctors' home. This is because, increasingly, the doctor is performing medical work (in the form of research, contact with patients, and contact with the medical community) from home.

Thirdly, the value of the Internet to the doctor will increase with diffusion amongst colleagues and, most notably, amongst patients. This will increase the number and impact of the contradictions. The nature and cause of these contradictions are best understood by applying DoI, where incompatibility, especially, is the most prevalent cause.

Fourthly, this diffusion, coupled with the development of the patient as partner as a strong mechanism to change, changes the shape of the diagram. In the scheme, while the patients are not quite subjects in their own rights, they exercise a great deal of control over the use of this instrument within the activity, and are certainly moving beyond an object with a voice.

### 8.5.2 Research Question 2: To what extent does Everett Rogers' Theory of Diffusion of Innovations predict and explain the Internet usage patterns by South African Primary Care doctors?



In Section 5.5, the specific predictions for South African Primary Care were identified. The data and discussion of the data relating to this question has been spread over three chapters, so, for ease of reference, Table 8-3 below repeats the predictions and summarises the findings.

*Table 8-3: DoI's predictions for SA GPs and the findings from the study of South African doctors, and conclusion on whether the prediction has been met.*

| DoI's Predictions (From Section 5.5) | Summary of Findings | Pred. Met |
|---|---|---|
| Access to and use of the Internet should be significantly higher than the national average. | For SA GPs, the access figure is 89%, while the national average is some 10 or 12%. This is a significant difference. | Yes |
| The curve of Internet uptake should be predicted by Rogers' graph (Figure 3-8). | The curve of Internet uptake (Figure 6-2) bears a close resemblance to that predicted by Figure 3-8. | Yes |
| While Internet access is a requirement for | Tables 5.6 and 5.10. Although infrastructure plays a crucial role, the data (Sections 6.5.3.3, | Yes |

| DoI's Predictions (From Section 5.5) | Summary of Findings | Pred. Met |
|---|---|---|
| Internet usage, there should not be a simple correlation between access and usage, as other factors determine usage. | 6.6.2.3, 6.6.2.5) indicates that there is not a simple correlation between access or access type and usage. In addition, improved Internet access was the least important factor for increasing email with patients (Table 6-14). (See next prediction for details of the other factors.) | |
| Problems of time and workload should be the greatest factors discouraging doctors' use of the Internet. Cost and confusing information and liability issues should also play a role in discouraging usage. | Time and workload (Sections 6.5.1.1, 6.5.3.3., 6.5.3.4) are presented as the greatest factors affecting amount of usage, and also prevents usage during a consultation (Section 7.5). Amongst non-users, lack of time is the 2nd-most important factor preventing usage (Table 7-1). (The first is inexperience, which, itself, would impact on the amount of time required.) Training was also the most important factor that would motivate a non-user to use the Internet (Table 7-2). Workload, and no access from the clinical practice are the 3rd most important factors. While cost was mentioned, it was not crucial, as costs are being reduced. Workload was the 2nd- most common reason for non-use of email with patients (Table 7-3). Confidentiality and liability issues were raised as crucial issues in the qualitative study (Section 7.4.4). Time and workload were also the most common reasons advanced for the low response rate to the survey (Section 7.8.2). Finally, 'access' problems also included organisational issues (such as logistics and managerial attitudes) (Sections 6.5.3.1, 6.6.2.1, 6.7.2.1 and 7.2). | Yes |
| The most common uses of the Internet should be email, followed by searching for information (especially in online journals). | Email was the most common (for both home and work usage) (Section 6.5.2, and Table 6-10). The other highest activities (Table 6-10) were visiting professional bodies' websites, online banking, travel arrangements, and reading online journals. The value of the Internet as an information source is also shown in Sections 6.9.1, 6.9.2, 6.9.3. | Partially |
| Although the percentage of doctors who use email with patients might be high, the percentage of patients with whom those doctors use email should be significantly | Table 6-10: the percentage of doctors using email with patients (21.2%) is not statistically different from the international figures. Section 6.11: Only a small percentage (6.4%) of their patients are involved. | Yes |

| DoI's Predictions (From Section 5.5) | Summary of Findings | Pred. Met |
|---|---|---|
| lower. | | |
| The use of email with patients might be patient-driven, with factors like increased patient satisfaction being a crucial aspect. | Section 6.11: 68% of the doctors report that patients initiate email. Table 6-14 shows that the greatest motivating factor for increasing email usage was patient demand. Table 6-13 shows that 53% of the doctors who use email with patients report that it increases patient satisfaction.<br>Table 7-3 shows that the most common reason for non-use of email with patients was that too few patients had it; the 3rd most common was that it had never been requested. (The 2nd most common reason was workload). | Yes |
| Although the percentage of doctors who report patients' bringing material from the Internet might be high, the percentage of patients who bring information should be significantly lower. | Section 6.12: in total 72% of the doctors reported that patients had brought material from the Internet. The percentage of patients bringing information, however, was very low (Section 6.12.6.2). | Yes |
| Correlations between usage patterns might show a general dominance by males over females, and a general dominance of young over old, but this will not always be clear-cut. | Sections 6.5.3.2, 6.6.2.2 and 6.7.2.2: Overall male/female figures show no statistical difference in usage. Although males shows greater amount of usage from work, the desire for usage from work is greater amongst females than from males. Males have used the Internet for longer, and spend more time on the Internet. Females spend more time on the Internet from home than males do.<br>Sections 6.5.3.1, 6.6.2.1, 6.7.2.1 show a tendency and greater desire for use amongst the younger doctors, but usage amongst this group is not always higher. Section 7.2 also shows that non-users tend to be older than users. | Yes |
| A significant reason for the similarity of usage patterns should the characteristic of homophily between the South African doctors and doctors in the rest of the world. | Section 6.15: from the qualitative study, the single most important factor for the usage patterns was that doctors in SA feel themselves to be part of the medical fraternity, with the same training, interests and concerns, and financial resources. This is the very definition of homophily. | Yes |

From Table 8-3, it is obvious that the predictions and explanations given by DoI have been borne out by the study of SA GPs.

There are also some issues not accommodated by DoI from the literature review that are indicated in this study.

Most importantly, what the literature review did not explicitly address was that the real value of the Internet in health care is not merely its use by doctors. Rather, it is the diffusion of the innovation amongst a range of others, especially the patients, that actually generates a great deal of its value. This patient-demand is not a minor issue of compatibility. Rather it is a driving force behind a series of issues that can only be understood in the light of ASM's contradictions.

Secondly, and similarly to the shortcoming of ASM, the literature review does not envisage the changing nature of the relationship between doctor and patient, and the extent to which the patient as partner develops as a mechanism for change in usage patterns.

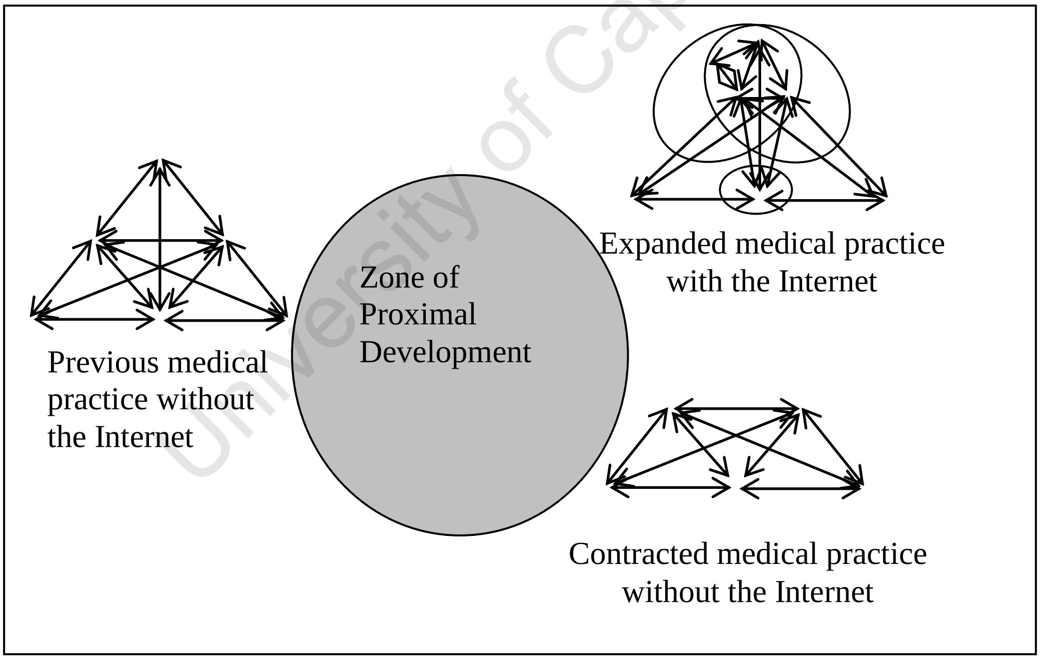
Thirdly, the significant difference between email with the colleagues and email with patients was not predicted by DoI.

The resolution of these incompatibilities in DoI can only be understood as resolutions to the contradictions in ASM that will continually arise as the Internet diffuses amongst doctors, patients, and the medical and administrative communities.

## 8.6 An overview model

Although the two theoretical Research Questions have been answered, it is clear that any answer relating to ASM has to reference DoI, and vice versa. Figure 8-4 showed the suggested ASM model with the incorporation of the home environment in the expanded scenario (top right-hand portion of Figure 8-4). In Figures 8-6, 8-7 and 8-8, however, the impact of DoI on this expanded scenario is developed. As a result, an overview model that incorporates the answers to both these questions (and combines Figures 8-4 and 8-8) is suggested in Figure 8-9 below.

*Figure 8-9: An overview model showing the two possible outcomes when contradictions in activities are introduced by the simultaneous diffusion of the Internet and the development of patient as partner*






In principle, in keeping with Engeström's model, there is movement across the zone of proximal development, with two possible outcomes. In this instance, however, the impact of the wealth of information and interaction with other parties offered by the

Internet, coupled with the impact of the patient as partner, means that, if the Internet is not utilised, the contracted activity is broken.

For much the same reasons, the expanded activity is altered to reflect the new types of interaction, with the patient and doctor occupying a great deal of common ground.

A final comment on the relationship between the contracted and expanded scenario is required: In the discussion of Figure 8-4, it was noted that the contracted scenario is likely to evolve into the expanded scenario (in other words, doctors working in that scenario may begin using the Internet). Because this can best be shown through a simple animation, this has been placed on the accompanying disk. As a result,

*Figure 8-10: Showing the possible evolution from the contracted scenario to the expanded scenario, is on the accompanying disk, in the file named Figure8-10ASMDoIContractExpand.gif.*

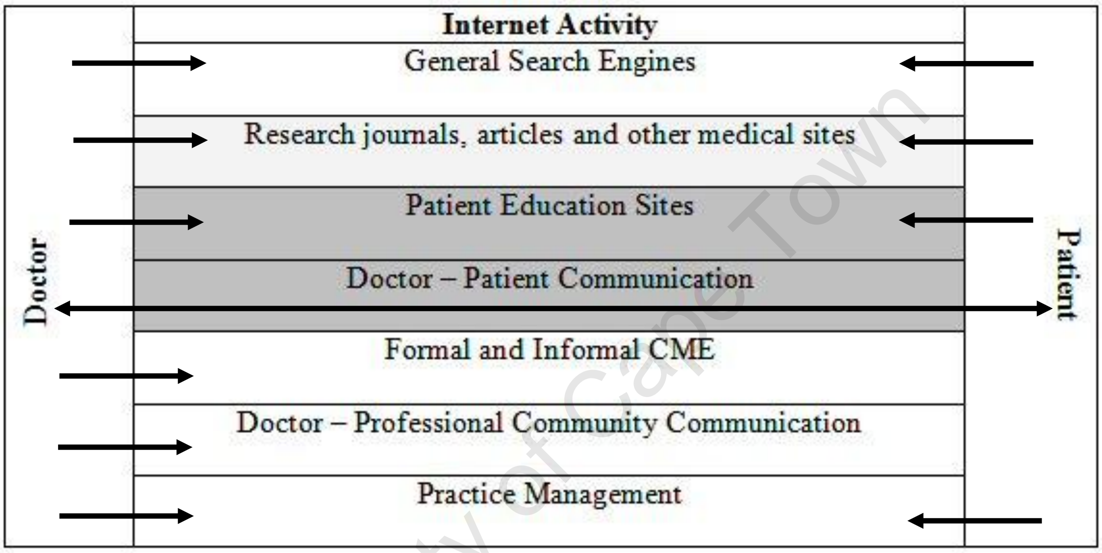
## 8.7 Details of the interaction

It is possible to go into more detail regarding the interactions in the expanded activity, with the Internet as the centre of the interactions.

### 8.7.1 Details of the interaction in Primary Care

Figure 8-11 shows the relationship of the Internet as an instrument in the delivery of health care. Both patient and doctor use search engines, but usually do so independently of each other. Patient education sites, journals and articles are also usually accessed independently, while email communication links the doctor and patient directly. Together, these two (greyed in Figure 8-11) form the core of what is utilised in forging the partnership. The doctor accesses CME, and communicates with the professional medical community. Finally, although the bulk of practice management is hidden from the patient, there is some degree of accessing practice management functionality in some areas such as billing. (Personal use of the Internet is excluded from this diagram.)

*Figure 8-11: Relationship of the Internet as an instrument in the delivery of health care*






The discussion of the model in Figure 8-9 spoke about the doctor and the patient working more closely together. The details shown in Figure 8-11 indicate a convergence of some of the activities (especially research, record updating, etc) performed by the doctor and patient in this closer working relationship. This "Activity Convergence" is best described as the process that occurs when some of the doctor's and patient's activities begin to resemble each other, and even become indistinguishable from one another. While this study concentrates on the relationship between doctor and patient, in the broader application of the Activity System, it is possible that Activity Convergence could occur between other components of the Activity Systems Model.

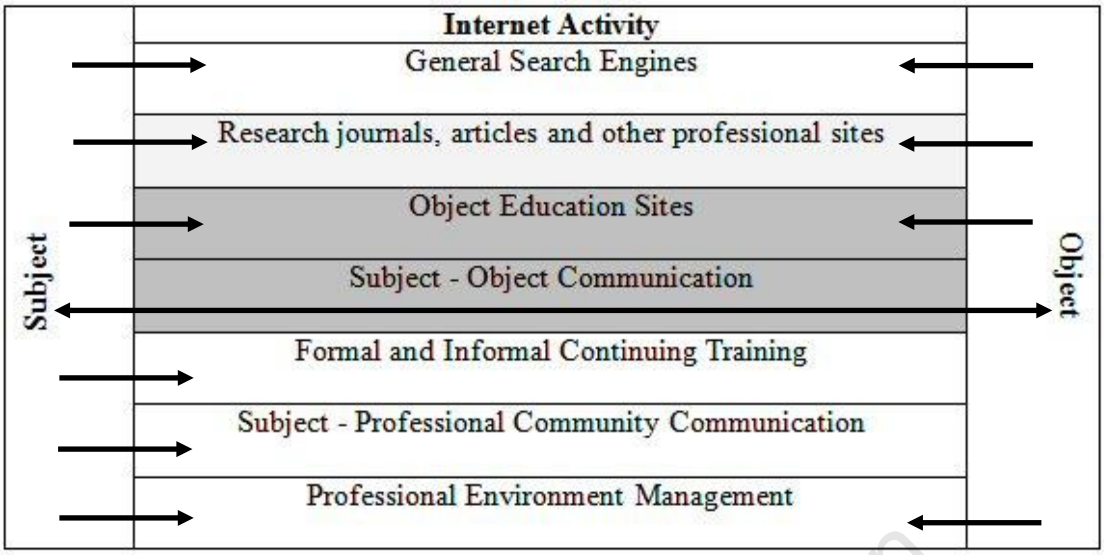
The model in Figure 8-11 shows only the relationship along the lines of Engeström's model, and excludes the models above that were based primarily on DoI. The medium of paper is, unfortunately, unable to include the DoI components without the figure becoming too complex, and portions of the diagram obscuring each other. In keeping with the spirit of the subject of this thesis, which proposes that the Internet be used to assist with many forms of communication, a web-page has been designed that allows for all the components to be represented on one page. To accommodate this,

*Figure 8-12: Showing the details of the interaction and the influence of DoI, is on the accompanying disk, in the file named Figure8-12DoIAndASM.htm, and may be viewed through a Web browser.*

### 8.7.2 Details of the interaction elsewhere

Finally, it may be possible to apply this model to other areas of workplace interaction between subject and object in which the Internet is used. Figure 8-13 shows the relationship of the Internet as an instrument in such a workplace. This might not be applicable to only other healthcare delivery scenarios, but also in other fields, such as education.

*Figure 8-13: Relationship of the Internet as an instrument in the workplace*




## 8.8 Conclusion

This chapter set out to answer the first two research questions. *En route*, it has discussed the results of Internet access and usage in the light of Rogers' Diffusion of Innovations, Engeström's Activity Systems Model, the international literature review on usage, the information from the survey and the qualitative study, and also in response to points of query raised in the earlier parts of the thesis. Using this information, this chapter synthesised the results into coherent models of processes and factors that lead to the descriptions given.

The answer to the two research questions has indicated that both DoI and ASM are valuable theories for interpreting the use of the Internet by South African Primary Care doctors. There are shortcomings, and these have been addressed through various models. Most importantly, the chapter has shown that the two theories work in conjunction with each other to give a more complete description of the processes, and therefore allow for a more complete understanding of the mechanisms and factors affecting the usage of the Internet by South African Primary Care doctors.

This understanding can be used as a basis from which to answer Research Question 3, dealing with practical application of what has been learnt. This will be done in the next chapter.

# Chapter 9: Practical Application

## 9.1 Introduction

The previous chapter focused on answering the two theoretical research questions. This chapter will attempt to answer the third research question: "What can be done to ensure that the Internet is used to best serve the needs of South African Primary Care doctors?"

To answer this question, it is necessary to be cognisant of:

- The theoretical description and predictions on diffusion of the Internet offered by DoI;
- The theoretical description of the workplace offered by ASM;
- The models revising and refining aspects of these theories, as described in the previous chapter;
- The five study areas described in Chapter 2 and addressed throughout this thesis, and
- Relevant aspects of the technological and sociological South African context.

In doing so, this chapter will answer this third question. It will do so by beginning with the general issue of access, and will then focus on the five areas of study. The answer, therefore, will not be a single and simple response, but rather a series of recommendations that may guide the process. Although some of the recommendations might be broad, most will be specific.

Each section of recommendations will reference the pertinent discussion in Chapter 8. This is done to clearly indicate the flow of information from data to theory to practical application.

Each one of these recommendations is large enough to form a detailed study by itself, but, in many instances, *ad hoc* work in these areas can begin immediately.

## 9.2 Physical access to a reasonable connection from place of work

**(From Sections 8.2.4, 8.2.5.5 and 8.2.6)**

While access does not determine correct and effective usage, it is a crucial requirement. To meet this requirement, the following should be implemented:

- A research program to determine the importance of costs when hospital and clinical administrators consider required Internet access. If this is proven to be a significant factor, then implementing a program at national level in which representatives from the public and private health sectors collaborate with Internet service providers to reduce costs of broadband connectivity for health care facilities.
- A program at national level to ensure that health care facilities, particularly those in under-serviced areas, are connected to the Internet at speeds to meet their requirements. Although this is needed for all GPs, for those working in the rural and peri-urban environments, and those working in hospitals and clinics, this requirement is urgent.

- While the equivalent of 56Kb a dialup connection per machine is the minimum, a broadband connection is desired, and is in line with the International concept of "Digital Opportunity" [315].
- Where security permits, access to the Internet should be from private workstations, rather than from public areas.

## 9.3 Expertise and interest

**(From Sections 8.2.5.2 and 8.2.6)**

Simply having the machine on the desktop accomplishes nothing if the doctor does not know how to use it. To meet the expertise needed, the following should be implemented

- Training plans need to be devised and implemented across the board. While a starting point might be already established programs, such as the International Computing Drivers Licence (ICDL), this should be seen as a short-term solution only.
- A more focused training program should be devised. It should be designed specifically, in conjunction with practising doctors, to meet the needs of the medical profession.
- It should begin by covering the basics of computing, and continue to the use of medical programs and administrative systems. It is imperative, however, that the training begins with a view to demonstrate the value of using the Internet in medical practice, rather than a view to merely having IT-competent doctors. From the results, it is certainly apparent that the doctors wish to deliver quality

health care, so the impact of demonstrating the value of the training for health care delivery will, no doubt, engender interest amongst those who are currently not interested.

- Similarly, administrators and managers need to undergo additional training focused on the strategic value of the Internet to the organisation, and to the delivery of health care.
- This training should be available in both face-to-face settings, and also as online instruction.  This will ensure that those doctors who cannot move away from their practices (such as those in rural areas or small practices) can access the training courses online.
- This training, plus periodic updates, should be recognised for CPD purposes.
- Current undergraduate medical courses should have a compulsory component in which competency in current software and best practices must be demonstrated. Many South African universities already implement such programs, but this needs to be formalised, following nationally-recommend guidelines.

As with all other medical training, the courses needs to be planned in detail, although concentration on the issues discussed in the rest of this chapter will provide a basic framework from which to start.

## 9.4 Time and workload

**(From Sections 8.2.5.1 and 8.2.6)**

Time and workload is part of a much larger problem facing the practice of medicine in South Africa, and so, for the most part, it is beyond the scope of this study. There are some contributions that can be made here.

- Having Internet access from the doctors' desktop rather than from a public area will reduce the amount of time taken to access the Internet.
- Having a faster connection to the Internet will reduce the amount of time waiting for web pages and other sources of information to be downloaded.
- Having the required training will reduce the amount of time wasted on disorganised searching methods and other such practices.



## 9.5 Home usage

**(From Sections 8.2.3, 8.2.5.4 and 8.2.6)**

While this study has concentrated on professional access from work, the amount of access from home is surprisingly high, and was addressed. The extent to which this usage is professional or personal is unclear, but, from this study, a substantial amount appears to be work-related. Given the reasons listed by the GPs, it is safe to assume that, if the requirements above are met, then the professional usage from home will be reduced – in fairness to the GPs, this is an aiming point. Other sociological factors will, however, continue to encourage usage from home, and, given that the meeting of the requirements given above will be part of a long-term plan, it is recommended that, in the short term, this usage from home be studied in more detail, and that doctors be compensated for the amount of professional online work performed from home.

## 9.6 The Internet as an information source

**(From Section 8.3.1)**

The prime problems concerning information needs in this thesis (Section 2.3.1) dealt with accessing formal and informal CME sources. Not all, but some of the needs can be met by the use of the Internet. For example, a CME course on the Internet cannot replace a locum. It can, however, ensure that the doctor can access the course without travelling, thereby reducing time wasted, and allowing the flexibility of online learning, and possibly reducing costs.

The most important role of the Internet as an information source, as demonstrated in this study, lies in the quick and convenient delivery of information that is accurate and current. In this function, for those who use it, it has demonstrated clear compatibility with needs, and relative advantage over other methods of information access. This applies to all forms of general medical research, as well as to patient-specific research. In addition, the convenience of having the articles available immediately and proper training on searching that will reduce the difficulty of navigating the material, will, no doubt, reduce the "number of unopened journals," and the need to access personal libraries of rapidly-aging texts. This facility will be of particular value to doctors operating in under-serviced sectors.

There is no doubt, then, that most of the problems of accessing information can be, and are being, solved by the use of the Internet in South African Primary Care.

To ensure that doctors can capitalise on these aspects of the Internet, the following is required:

- Easy access to an Internet-connected computer, as described above, is necessary.
- The training outlined above needs to contain a detailed section on searching on the Internet. This should cover:
    - The appropriateness and limitations of general search engines (current examples are Google and Yahoo).
    - Stepping to the level of Google Scholar, requiring no specialised knowledge or registration, and operating in the same way as Google.
    - The use of other searchable databases such as PubMed, Medline and WebMD.
    - For larger research projects, searching across databases by using tools like EBSCOHost.
- Online formal and informal CME courses and utilities, aimed specifically at South African conditions, need to be created, and available for reduced-cost or even free access by GPs. A central location, such as that provided for Australian doctors by gplearning [490], can serve as a common starting point.
- Access to journal articles indexed in PubMed should be subsidised. At the very least, recognising the wide disparity in services across the country, South Africa should be listed as a country eligible for HINARI membership.

## 9.7 The Internet as an means to communicating with colleagues

**(From Section 8.3.2)**

The use of the Internet allows for greater communication amongst doctors. Although all doctors will benefit, this will be especially useful for doctors in remote areas, doctors in small practices, or doctors confronted with rare conditions.

In addition, the use of email grants the doctor the flexibility of asynchronous communication. This means that doctors are able to communicate with other doctors who are not currently available (because of work commitments or because they are in different time zones), and also allows those doctors to access their own resources before responding to questions. For synchronous communication, the use of Internet telephone (VoIP) tools will allow for inexpensive communication at a distance [18].

Although SA GP's use of the Internet for communication with colleagues is higher than the international norm, given the issues of isolation, it is likely that the need for this communication will increase. To ensure relative advantage of this activity, the following recommendations are made:

- In the same way that is discussed above, access from work, training, and attitudes of management need to improve so that such communication is part of a doctors' daily life, if not from work, then at least from home.
- Because face-to-face synchronous communication does have advantages over email communication, the use of Internet telephone (VoIP) using free software (such as Skype), will allow for greater synchronous communication. As part of the training courses outlined above, doctors should be trained in the use of VoIP

tools, and should be encouraged to use them. This will require bandwidth over the 56Kb limit, and will also require a serious review of the network use policies in many places of work.

## 9.8 Email with patients

**(From Section 8.3.3)**

While communication with patients via the Internet is a sensitive area, simply ignoring it will make the problems more difficult to solve. There is a need to recognise that patient demand for email communication with doctors will increase, and that it does have great value. As with any other part of their service, if doctors refuse to have email contact with patients, they will risk losing those patients to other doctors [338; 430; 491], or will compromise the patient-doctor relationship [492]. For that value to be properly exploited, however, the barriers need to be overcome.

High patient-demand is driving doctor-patient email communication, and, as the use of the Internet diffuses amongst the general population, this demand is bound to increase. Currently, however, the low amount of email communication with patients makes it difficult to assess the extent to which some of the problems identified in the Chapter 2, such as medical jargon and language, can be addressed by email communication. There is nothing in any of the evidence to suggest that the Internet can assist with problems of different language abilities during the consultation, although multi-cultural web-based resources can reduce the communication problems between doctors and patients [493]. In addition, electronic communication does give patients a permanent record of the information, so that they have the opportunity to re-read the information, and perhaps use other people (or electronic translating software) to assist with understanding the communication. The value of this will have to be the subject of a detailed patient study.

From the GPs' perspective, the facility to answer simple questions via email allows doctors to save their own and their patients' time, and also allows patients to ask questions that they forgot to ask during the consultation. Online disinhibition [343-345] encourages patients to reveal information that they may be reluctant to do in a face-to-face situation, and yet which may be crucial for treatment. Finally, especially for difficult or rare situations, the doctors themselves have time to reflect or access resources before offering advice to patients.

Overall, the use of email with patients indicates a shift in the dynamic in the patient-doctor relationship, and, if abused, threatens to negatively impact on that relationship. It is therefore crucial that, for email communication with patients to be effective, clear guidelines and boundaries must be established and followed. Ideally, as exists in other countries [494; 495], a national set of guidelines needs to be drafted, and workplaces should have policies that take note of the guidelines. Until such guidelines exist, workplaces and individual doctors should produce their own set of guidelines, perhaps drawing on other countries' guidelines, and covering at least the following issues:

### 9.8.1 Patient expectations of response times

Careful management is required with patients' expectations regarding the online availability and accessibility of doctors. During working hours, doctors have consultations with other patients, ward rounds and other commitments, and, as a result, are not constantly online. After-hours, doctors have private lives and are not available on a 24-hour call system. Patients need to be made of aware of these issues, and need to adjust their expectations accordingly.

### 9.8.2 The art of writing

As part of the recommended training, doctors will need to undergo extensive training in the art of written communication with patients. They will need coaching in the transition from verbal communication, with all its listeners' cues of understanding and ability to query, to the written form, where these are absent, and where one needs to balance detail against clarity and simplicity.



### 9.8.3 Acceptable topics

Patients and doctors need to be aware that some topics are acceptable, while others are not, and these need to be clarified. Many of the acceptable topics concern administrative tasks, so a second email address for administrative issues should be available. Unacceptable topics focus primarily on medical information. In addition, given a possible delay in response times, it is unlikely that using email for urgent medical business is suitable.

### 9.8.4 Charging

The issue of charging for emails needs to be investigated. Generally, items not currently attracting charges (such as appointment changes), should not attract charges if dealt with via email. Other activities, assuming that they fell within the 'acceptable topics' above, if they replaced work that would normally be performed in a consultation, may attract a charge.

### 9.8.5 Permission

The issue of permission needs to be investigated. Although some may see the use of email as intrusive, it might also be viewed as equally as intrusive as use of the telephone (or even less so), especially less so than phoning patients on their cell phones. Given this grey area, in the absence of guidelines, it is prudent for doctors to ask for permission to use email. Given the demand from patients, it is unlikely to be refused.



### 9.8.6 Security and confidentiality

Security and confidentiality were raised as issues of concern, and so they should be. Two areas needing consideration are:

#### 9.8.6.1 In the doctors' offices, home and elsewhere

- Almost all electronic communication with the patient (including billing information) is likely to contain information that is confidential, and, therefore, should be secured.
- The doctor's own storage system (including backups) should be encrypted, especially if there is use of any portable devices, such as laptops or external hard drives.
- As with all other patient-doctor communication, copies of email communication should be kept with the patient's record.
- If the doctor performs any of these functions from home, then the same security should be implemented at home.
- If the doctor has family members in the same home, the doctor should work on a separate, password-protected machine.
- If the doctor performs any of these operations through publicly accessible wireless networks (as may exist at an airport, conference centre or hotel), he should also check with email providers on the level of security offered in the email system.



#### 9.8.6.2 In the patients' offices, home and elsewhere

Although it is not the responsibility of the doctor to ensure that the patients' systems are secure, a brief general information brochure (along the lines of the measures listed above) will go some way in reducing possible problems in the future.

### 9.8.7 Further patient study

As mentioned in the discussion, this has been a survey of doctors, and so patients' perceived needs are filtered through doctors' experiences. A detailed survey of patients' views regarding email with doctors, and health professionals in general, should be conducted. This should cover the motivations and barriers, and take special note of increasing accessibility of email, especially in the rural and peri-urban areas.

## 9.9 Patient as partner

**(From Section 8.3.4)**

The patient is now a partner. What the evidence has shown, is that, in order to perform as partner, the patient needs access to accurate and easily understandable medical information. This information is available for the patient on the Internet, and, where it is not, must be created. The difficulties are ensuring that the patient has access to that information and can understand it, that the doctor is willing to embrace the concept, and that the patient is willing to behave as a responsible partner.



While SA patients' access to the Internet is low, it is growing. This is the ideal opportunity to implement a solution that will be able to grow to meet the demands for easily searched accurate and appropriate materials. The provision of an index of sites will allow sites to be graded in complexity and other criteria, thereby ensuring that the patient is accessing appropriate information. Instead of performing exhaustive searches of patient sites, or run the risk of patients' seeking out their own sites, doctors will be able to rapidly access vetted sites, and be able to recommend them to patients.  This will ensure that the patient has the necessary resources to take the role of active partner in the healing process.

Doctors' responses to the practical implication of the patient as partner is more complex, and this study has looked primarily at the aspect of the patient bringing in material from the Internet.  In this light, it will require the doctor to relinquish some control over the searching for material, acting as a guide, and perceiving the benefits of having a (albeit junior) partner, or learning collaborator [34], who is concerned with the wellness of the patient, and is prepared to perform initial research and self-education.

This is a challenge to the responsible patient to use information wisely, and to perform the role of partner, not antagonist.

In the role of partner, the patient who desires to be an informed partner, and who does have access to the Internet, almost certainly will consult the Internet for information. In the previous chapter, Table 8-2 laid out 5 variables and their desirable characteristics.  Table 9-1 below expands on that table, and recommends action to be taken in order to reach those required characteristics.  Note that, for the first two variables, the recommendations are conflated into one set.

There are valuable starting points, especially for those doctors who do not have the resources for seeking out patient education sites.  Doctors can spend a little time evaluating specific areas.  One of these sites is the Patient Education Institute's [496] set of Interactive Health Tutorials, now accessible, free of charge, through MedlinePlus [497].

*Table 9-1: Variables, their desired characteristics, and recommendations for achieving those characteristics, that impact on the patient-doctor relationship and the concept of patient as partner, when patients bring material from the Internet to the consultation*

<table>
<tr><th>Variable</th><th>Desirable Characteristics</th><th>Recommendations for achieving</th></tr>
<tr><td>The quality of the material.</td><td>o The material needs to be medically accurate, preferably from reputable sites.<br>o Although it needs to be evidence-based, it also needs to be uncluttered by extraneous information.<br>o The context of the material needs to be clear, so that a knowledge of influencing factors, and patient expectations, can be achieved.</td><td rowspan="2">Source Material<br>o An easily searchable, web-based, publically-available, database index of web sites, contributed to and vetted by both patients and doctors. The index should contain<br>• A full description of the site, including type (e.g. journal article, blog, support group) subject, source, URL, etc.<br>• Links to a glossary of the more complex terminology, especially where this terminology refers to conditions frequently described by other terminology, or lay vocabulary<br>• Commentary on the degree to which the material is main-stream accepted, or currently on the fringe, or not easily supported by scientific data.<br>• Links to other similar entries in the database index.<br>o The material should be graded according various criteria, such as:<br>• Accuracy<br>• Level of medical knowledge required for understanding<br>• Applicability to different demographic groupings and susceptibilities<br>o Given that patients will seek out new sites, they should be able to register these sites into the index, even if they cannot vouch for the accuracy or applicability of the information. This will be flagged, and doctors (and other patients) can comment on the site, and alter the various ratings.<br>o In a process similar to Wikipedia, contributors should register, and should be prepared to present publically visible, non-identifying (if desired) profile material of themselves.<br>Use of the material<br>o While some patients will wish to search the database with no or little guidance, it would be far more desirable for the doctor to perform the initial search. This</td></tr>
<tr><td>The patient's understanding of the material</td><td>The level of the material needs to be suitable for the specific patient, based on appropriate demographic factors, such as education levels and age.</td></tr>
</table>

| Variable | Desirable Characteristics | Recommendations for achieving |
|---|---|---|
| | | will ensure that the material is not overwhelming for the patient. More sophisticated patients can be guided in their search to an ever-decreasing extent.<br>o The material can be used as common research material on which to base many of the joint decisions regarding interventions.<br>**CPD points**<br>o CPD points should be granted to doctors for their contributions to the material. |
| Impact of inevitable self-diagnosis | o Attempts at definitive self-diagnosis need to be kept to a minimum or excluded altogether. Even if accurate, the diagnosis needs to be based on more than a simple matching of similar and self-measured symptoms. Action taken on that self-diagnosis, without consulting with the doctor, must be avoided totally. | o Patients need to be guided in some of the processes of diagnosis beyond the simple matching of perceived and self-measured symptoms.<br>o Patients need to be aware of the dangers of taking actions based on this self-diagnosis, without first consulting with the doctor. |
| Doctor's attitude towards the practice. | o An environment that is positive and encouraging, giving the patient an opportunity to investigate his or her condition with guidance from the doctor, at a pace that is suitable for the patient. | o Doctors need to be aware that all that is unknown to them is not necessarily incorrect. Their patients do have the time and interest to investigate their conditions, and this can be successfully utilised.<br>o Doctors need to see the consultation as an opportunity for further learning and development, and the acquisition of knowledge that will be of benefit to the current patient, and to other patients.<br>o This experience should not be viewed as a confrontation between patient and doctor. Rather it should be viewed as a pleasurable experience in which the doctor interacts with a junior partner in the solving of problems. The discussion is in-depth, and far more gratifying that one that concentrates on superficial issues only.<br>o Especially for patients with chronic conditions, this is an opportunity for the development of a long-term relationship in the true spirit of Primary Care. |

| Variable | Desirable Characteristics | Recommendations for achieving |
|---|---|---|
| | | o Doctors need to be trained on working with patients using information from the Internet.<br>o The use of the Internet during the consultation (in much the same way that a doctor would use a plastic model or a diagram), where appropriate, will go some way to encouraging the patient's use of it.<br>o Given the emphasis on the value of this approach in increasing the doctors' knowledge, it would be desirable for this approach to be recognised as Professional Development. Just how this would be achieved, though, is unclear and needs to be investigated.<br>o Finally, doctors need to be aware that there will be circumstances where patients' using information from the Internet is not appropriate, and the circumstances of the patient and the condition need to be taken into account. |
| Patients attitude towards the practice | o A mature response in which the patient recognises that being a partner in the process carries with it responsibilities, and that, meeting these responsibilities will take some effort. | o Patients need to be willing to be trained and guided in the best approaches to dealing with difficult material. This does bring with it extra burden and responsibility, at a time when it is perhaps least desired.<br>o Patients need to realise that the time they have affords them the opportunity to investigate resources not easily available to their doctors. Simultaneously, they need to remember that their doctors do have a wealth of information, and that the aim of the patient participation in the consultation is better health care delivery by combining knowledge.<br>o The patients need to realise that this is not an opportunity to dominate the process, show off, or to 'catch the doctor out.' A knowledgeable patient in a confrontational situation serves no good purposes, and is counter-productive, wasteful, and dangerous. Rather, it is an opportunity to participate and build a strong working relationship with a knowledgeable professional whose ultimate goal is to assist. |

## 9.10 Practice management

**(From Section 8.3.5)**

The need for the use of the Internet in practice management is as great in South Africa as it is in many other countries. If doctors are properly trained in the use of, and have easy access to, good practice management software, the process of billing and claiming from medical aids and insurance companies will be greatly streamlined. In addition, patient records will be transferred, or made available, so that the relevant information is available to the health professional requiring that information, thereby reducing risks associated with inaccurate record keeping, or the time taken to search for specific information in patient records. Added benefits, such as allowing the patients' access to their EMR, and the future use of e-Prescribing, need to be explored.



Practice management recommendations apply primarily to PGPs, although there are instances where some activities are of value to other GPs.

- The complexity of the medical aid and insurance systems appears to require investigation, so that it can be simplified to encourage GPs to submit their claims electronically and accurately.
- While it appears that practice management software can be simplified, it is also apparent that doctors feel untrained in the use of the software, and the training course discussed above must include a component on the use of practise management software.

- That software, however, must be used in the practice, and all doctors should have access to it.
- The software should allow for the swift transfer of, or wide accessibility to, patient records. If a national data base is not yet feasible, then all such software should conform to electronic database standards, so that, in the event of transfer of records, the process of conversion is seamless.

## 9.11 Conclusion

This chapter has concerned itself with answering Research Question 3, dealing with the practical application of what has been learnt in this study. The information has flowed from the five needs discussed in Chapter 2, the literature reviews, DoI and ASM, the data from the study of SA GPs, and the models constructed in Chapter 8. While most of the recommendation will require detailed studies before implementation, many can be implemented reasonably quickly and inexpensively.

It now remains necessary to reflect on the process of this study, and to point to possible routes forward. This will be done in the next chapter.

# Chapter 10: Evaluation

## 10.1 Introduction

Before I conclude this thesis, it is necessary to reflect on some of the processes that have been involved in the study. There are a number of issues to raise. These include the use of DoI, the overall design and limitations of the study.

## 10.2 Use of Diffusion of Innovations

In the discussion of the theoretical background, several limitations and criticisms of DoI were raised (Section 3.10). In response, it is necessary to explore the extent to which these have negatively impacted on this study, and the steps taken to minimise their negative impact.

*Application to developing countries:* There was the contention that DoI might not be applicable to developing countries. This thesis has discussed South Africa, which is not a typical developing country, although not a developed country. In this particular exercise, one of the most important aspects of DoI was the prediction that, based on their education, status, and membership of an international homophilous community, South African GPs' usage of the Internet would be markedly greater than the general SA population, and the activities and patterns of usage would resemble GPs in the rest of the world. In spite of the differences caused by local conditions, this prediction has been borne out, and so there is nothing is this study to cast doubt on the applicability of DoI in developing countries.

*Applicability to complex social systems:* From what has been seen of the behaviour and responses of the doctors, they certainly fit Oettlé & Koelle's description that they are "aware and intelligent managers, who must not only have access to a wide range of information…but must be able to translate and integrate this information into management decisions that will result in sustainable enterprises" [209]. Again, then, with the predictions and descriptions of DoI proving to be accurate, there is nothing in this study to suggest that DoI is not applicable to complex social systems, in Oettlé & Koelle's sense of the term.

*Pro-innovations bias:* While there is likely to be a tendency towards pro-innovation bias on the part of the researcher, I have been at pains to avoid the dangers of pro-innovation bias by closely examining the reasons for non-use of the Internet amongst SA GPs. In cases where GPs have chosen to not use the Internet (or parts of it), these have been presented as legitimate reasons, and have been incorporated into the theoretical models in Chapter 8.

It is obvious from the results that many of the non-users are biased towards usage, and their non-use is as a result of circumstances beyond their control, such as lack of access and training. The fact that 68.8% of those who do not have access from work do want that access, and 73.1% of the non-users indicated that they could be motivated to use the Internet, shows a strong bias towards the innovation amongst those who do not currently use it. In this light, it is natural that the overall argument of the thesis would tend towards usage.

*Source bias:* To limit source bias, the only sources of funding for this study were the University of Cape Town, the South African Medical Research Council, and the researcher's private funds. No other companies (such as Internet Service Providers or Telecommunications Companies) are in any way connected to this study.

In addition, as discussed above, the study has investigated the reasons for non-adoption in both the survey and qualitative study. These reasons have proven invaluable in answering all three research questions.

*Recall problems:* Participants in the study were questioned primarily about their current usage patterns, with very little information requested about their past usage. This has meant the recall problems have not affected the validity of the study.

*The power of prediction*: For this study, the major prediction has been on the doctors' current usage patterns, and, as has been covered, this prediction has been borne out by the results. Given the accuracy of this prediction, this thesis has ventured one further prediction: that the patient demand for email interaction, and patients bringing information from the Internet, will increase, and that these will join with the further development of the patient as partner to become major driving forces in altering the patient-doctor relationship.

*Determining causality*: The causality and reasons behind much of the survey data, was determined by the qualitative study that followed the survey.

## 10.3 Study design

As shown in the Research Methodology, the design of this study was different from many preferred approaches. The first difference was that, instead of having either a quantitative or qualitative approach, this study had both.

Secondly, where a combined approach is used, it usually has the qualitative study first, followed by a quantitative study. This study reversed the order.

Thirdly, when the qualitative study is performed first, it usually pre-selects a group, based either on their usage patterns, or a random sample. This study chose its group purely on the principles of Grounded Theory's pursuit of theoretical saturation. Apart from being more closely aligned to the ideals of Grounded Theory, it ensured that a broad spectrum of participants had been selected so that opposing views could be measured against each other, and also reduced the possible impact of using small focus groups.



Combined, and in this order, this approach has allowed the researcher to delve deeply into the results of the survey, and explore reasons and complexities either not explained, or apparently contradicted by different survey results. One such example was the apparent contradiction of doctors' views regarding patients bringing material to the consultation. While a large number said that it had increased the quality of the consultation, far fewer said that they felt positive about it. This contradiction, and others, could only be resolved by means of the follow-up qualitative study.

Another contentious issue was that, while Grounded Theory usually requires either no or very limited literature review, this study performed a detailed international literature review. The first reason, mentioned by other researchers [227; 246], is that obtaining institutional approval and funding without such a review is near to impossible. That is perhaps a comment on the institutions' views of 'scientific' research approaches more than a comment on Grounded Theory. The second reason is that Grounded Theorists themselves argue this point and it appears that, as long as the research requires it, it is justified [227; 247]. The third and prime reason is the great advantage, which is that the survey was able to combine concerns from the international literature (allowing for easier comparison with international trends), with the theoretical views of Rogers' and Engeström.

Finally, the question rubric given in Chapter 3 was developed specifically for this study, and is not intended as a general model for other studies. It does, however, have a basic functionality that harnesses the value of linking a survey with a qualitative study, and could form the core of a further study.



## 10.4 Limitations of the study

There are four limitations of this study that need to be addressed.

### 10.4.1 Overall low response rate

An obvious limitation of the study is the overall low response rate to the survey. This low response rate to postal surveys amongst doctors is a problem internationally [498-

500], usually because of lack of time or overload of work. Other national postal surveys of doctors have received response rate of less than 30% [266; 274; 299], while others conducted via telephone have specifically targeted a low percentage of registered doctors, with no indication of the numbers who were not contactable, or who declined to participate in the survey [25; 267; 268; 284]. Indeed, the doctors who participated in this study did not regard the 10% rate as particularly low.

When responders were asked for their reasons for responding, not a single doctor mentioned any of the predictors that are usually cited for high response rates [258; 498; 501]. This is an area that might be investigated further.

Indeed, the difficulty experienced in making appointments with doctors for the qualitative study, their emphasis on time problems, and their comments on the response rate leads one to believe that, until this issue is resolved in SA, it is unlikely that figure will ever be statistically significantly higher.

Nevertheless, the comparison of the samples' demographics with the SAMA database indicates that the sample is highly representative (except for age, and this is discussed in Section 10.4.3 below). In addition, the deep probing in the qualitative study allowed further investigation into issues raised, ensuring that the data presented were as comprehensive as possible. In this way, the survey data, the correspondence to the data base, and that follow-up qualitative data were triangulated to ensure a high degree of validity of the interpretations.

### 10.4.2 Non-users did not respond

There is also the possibility that more doctors who used the Internet might respond. If this is true, then it would also be true of the other surveys to which this survey is compared. In addition, the data from the follow up with the non-responders is statistically consistent with the greater sample, therefore the hypotheses that the respondents were disproportionately Internet users is highly unlikely.

### 10.4.3 Low response from younger doctors

In this survey, compared to the numbers in the SAMA database, there was also the low response rate from the younger groups. This was unexpected, because surveys frequently have a disproportionally *higher* response from younger GPs [499; 502].

If one examines SA's migration patterns, it becomes clear that this is part of a much larger and well-documented problem: the loss of doctors from South Africa to developed countries. These losses are usually amongst the younger doctors, many of whom view their qualification as their ticket to a better life elsewhere, and to pay off their study loans [503-513]. Although replacement recruitment is ongoing, it is only marginally successful; partially because emigration from SA is officially under-reported, and SA doctors remain registered with local professional councils, using local addresses [511; 514].

The most important implication of the low response from the younger doctors might be that this survey under-reports, rather than over-reports, the Internet usage rates amongst SA GPs.

Finally, the SAMA database itself appears to be out of date. Indications of this include the fact that only 14 of the 50 non-responders could be contacted, and that more than 700 GPs (4.1%) in the database are over the age of 65 (the oldest is 109).

In spite of the low response, because there has not yet been a study of SA GPs, and the fact that the demographics of this sample so closely correspond to the demographics of the SAMA database, the results of this study are still worth using.

### 10.4.4 Limitations of time and the qualitative study

As is clear from many of the results, the doctors were not easily available for interviews, and, when they were, they were usually operating under severe time constraints, even when the interviews were conducted after hours. As a result, there were several avenues that had been highlighted in the survey as interesting and requiring further exploration, and which could not be deeply explored in the qualitative study. For example, communication with colleagues via email was probed, but the differences between the various demographic groups were not explored deeply. This will be an area for further research.

### 10.4.5 Search terms

There may be a problem because, between 1995 and 2002, email was included in the broad MeSH term "Computer Communication Networks," and this term was not included in the search process (described in Section 4.4.4). Later tests, however, showed the impact of this error to be limited in their impact on the results – searches on PubMed for articles published prior to 2003 show a large number of researchers using "e-mail" within their papers (and even in titles and as keywords), as is supported by many of the sources found in this review (e.g. [31; 59; 151; 251-253; 265; 271; 274; 277; 278; 282; 285]).

## 10.5 Areas of research identified as requiring further study

The qualitative study has largely been successful in explaining the results found in the survey, and forming a ground for the theoretical models. There are, however, some new questions that have been raised, and these areas warrant further study.

*Other professions*: The model has focused on doctors in Primary Care. It would be useful to investigate the applicability of this model to other health professionals who would have similar needs for information and interaction with patients. In addition, other professions that are service-oriented and increasingly using the Internet, such as education, might also be described by this model.

*Relationship between poor infrastructure at work and home usage*: While figures for urban GPs allow for definitive statements on this issue, the survey response from rural and peri-urban areas was too low for similar statements from these areas.  Because of the qualitative comments from GPs in these areas, there is possibly a correlation between poor infrastructure at work and home usage, so this needs to be investigated.

*Male versus female usage*: The differences in usage between males and female appear connected to access from work and sociological forces.  The exact extent to which these affect overall usage differences, is unclear.

*Cost*:  Especially in an area that is constantly changing (and changed during the period of research), the effect of connectivity costs in South Africa should be investigated.

*Older doctors' frequency of usage*:  Although the greater frequency of usage by older doctors as given in the survey might be a statistical oddity, it is too easy to dismiss it as such, and similar surveys amongst similar groups of users will be able to shed more light on this.  A possibility might be simple: one comment by a doctor, that they use it to communicate with their children and grand children via email, is supported by at least one other study on adult computer users [367].

*Reasons for responding*:  As has been mentioned, none of the respondents, when asked for the reasons for their responses, mentioned any of the predictors that are usually cited for high response rates.  The literature on this subject is primarily in the form of literature reviews, and primarily focuses on identifying characteristics mentioned by the researchers in their articles.  The inconsistency between the responses in this study and those given in the literature might well benefit from a follow-up qualitative study to determine the accuracy of these factors.

*A study of patients*: Insights into patients' needs and demands have been gained exclusively through the perceptions of the GPs. A detailed patient study on their usage of the Internet is required to complement the models developed in this thesis. That study should examine, *inter-alia*, the main advantages for patients to using email and the patients' experience of using the Internet as a source of medical information, for both private use and when brought into the consulting room.

Finally, the Internet forms part of a broader component of communication in the 21st century. A few of the doctors did mention the fact they receive text messages on their mobile phones ("SMSs") from their patients (Section 7.4.2). As the nature of the patient-doctor relationship changes, it is possible that mobile texting will play an increasingly significant role, and should be explored in more detail.

## 10.6 Conclusion

This brief chapter has reflected on some of the processes involved in this study. It has covered the use of DoI, and has also commented on the overall study design of the project, explaining the reasons and value of the design chosen. Thirdly, it covered the limitations of the study, and gave details of the impact of these limitations. Finally, in recognition that a study of this type opens new areas for further study, it has identified several of these, with a view to furthering research in the discipline.

The next, and final, chapter will present the conclusions of this study.

# Chapter 11:  Conclusions

## 11.1 The purpose of the study

This thesis has dealt with South African Primary Care doctors' use of the Internet in the light of Yrjö Engeström's Activity Systems Model and Everett Rogers' Diffusion of Innovations.  It has set out to answer two theoretical questions and one practical question.  The two theoretical questions were:

*To what extent does Engeström's Activity Systems Model accommodate Internet usage by South African Primary Care doctors?*

and

*To what extent does Everett Rogers' Theory of Diffusion of Innovations predict and explain the Internet usage patterns by South African Primary Care doctors?*

The practical question could be answered only once the theoretical questions had been addressed. This practical question was:

*What can be done to ensure that the Internet is used to best serve the needs of South African Primary Care doctors?*

## 11.2 The methods

In order to answer these questions, it was first necessary to understand the context of Primary Care in South Africa, and some of the specific needs of Primary Care doctors. From the literature, these were identified as five study areas summarised as:

- information needs,
- need to communicate with colleagues,
- need to communicate with patients,
- need to have the patient as partner, and
- practice management needs.

After these study areas had been established, the thesis identified and examined the Activity Systems Model and Diffusion of Innovations as two theories that would have a direct bearing on understanding these study areas. Research Questions 1 and 2 focused on the relationship between these two theories and the South African Primary Care doctors' use of the Internet.

From there, the thesis followed a three-part study aimed at supplying data to answer the research questions. The first part of the study used a systematic literature review of surveys of doctors' use of the Internet to describe the international use of the Internet by doctors. Through the concept of homophilous communities, DoI predicts an international similarity of usage within professions. Because of this similarity, DoI's predictions for Internet usage by South African Primary Care doctors could be identified through the review. These were the predictions that would be measured during the course of the thesis in order to determine the extent to which DoI could predict the Internet usage patterns of South African Primary Care doctors.

Although the prime aim of the review was to establish these predictions, it had a secondary purpose. It indicated a lack of survey results outside Europe and North America, and this gap in our knowledge needed to be closed. A survey of South African Primary Care doctors would go some way in closing that gap.

The second part of the study detailed the survey, conducted amongst 2 600 South African GPs. This survey gathered descriptive data on South African Primary Care doctors' use of the Internet. The survey form was broad, and (apart from demographic data) included questions dealing with activities on the Internet, amount of time, length of usage, location of usage, interactions with patients, motivators for and barriers to usage. It also addressed non-users, examining reasons for non-use of the Internet.



From the results of the survey, issues that required deeper exploration were extracted. These were primarily issues of contradiction between the results. An attempt was made to understand and resolve these contractions in the third part of the study: a follow-up qualitative study consisting of interviews and focus groups. The qualitative study probed unresolved issues raised by the survey, and, through the constant comparison method of Grounded Theory, laid the groundwork for the development of the theoretical models to follow.

The data were then discussed in the light of the theories, and models explaining the mechanisms and processes leading to particular usage patterns were developed.

Research Question 1 was then answered. By comparing the information from the survey and the qualitative study, to the descriptions of interactions given in ASM, this thesis was able to determine the extent to which ASM could accommodate Internet usage by South African Primary Care doctors, and could also identify required modifications to ASM in order to improve this accommodation.

Next, Research Question 2 was answered. By examining the South African Primary Care doctors' usage patterns and reasons for these patterns, and comparing these patterns and reasons to those predicted by DoI at the end of systematic literature review, the thesis could answer Research Question 2, dealing with the extent to which DoI could predict and explain the usage patterns of South African Primary Care doctors. The answer also pointed to issues that were not predicted, and commented on the implications of this for DoI.

Finally, the third Research Question was answered in the preceding chapter. In doing so, the theoretical models from the data were applied to the current South African situation, and recommendations were made that would assist in the usage of the Internet by South African doctors.

## 11.3 A review of the research questions

Given the methods described, this section summarises the results of the study in answering the three Research Questions.

### 11.3.1 Research Question 1

ASM was found to easily accommodate most of the processes in the context of the South African Primary Care doctors' use of the Internet. There were, however, some important issues not identified in ASM. Firstly, that the lack of Internet usage by doctors does not result in merely the use of previous methods to achieve the required goals. Rather, because of the amount of new content and activities not previously available, non-use will have a negative impact on health care delivery. Secondly, the Internet had introduced a new dimension: a significant usage of this instrument from home or from other areas of the doctors' private space. Thirdly, the diffusion of the Internet amongst patients and the wider medical community will increase its value and contradictions, and this diffusion process can be explained only with direct reference to DoI. Fourthly, the emergence of the concept of patient as partner in Primary Care combined with the availability of the Internet had significantly altered the doctor-patient interactions and, therefore, the shape of ASM.

### 11.3.2 Research Question 2

Similarly, DoI was mostly successful in its predictions of the South African doctors' Internet usage patterns, and the reasons for those patterns. Some areas could not be predicted by DoI. Firstly, that the value of the Internet in health care is determined, not merely the doctors' use, but by the diffusion of the innovation amongst others, both colleagues and patients. Many of the drivers of this diffusion can be understood only with direct reference to ASM. Secondly, the role of the patient as partner was not predicted directly by DoI. Again, exploring this in the light of ASM has shown that it is a powerful force in the diffusion of the innovation amongst doctors.

Given the accuracy of the prediction, this thesis went further, and has predicted an increased use of doctor-patient email communication, increased incidence of patients bringing material from the Internet into the consulting room, and that these trends will couple with the patient as partner to change the patient-doctor relationship.

### 11.3.3 Research Question 3

The practical applications of the lessons learnt have been dealt with in detail. Although a range of recommendations has been made, a few stand out as crucial. Firstly, access to the Internet must be addressed as an activity requiring more than physical access, and also requiring an organisational attitude change, expertise, and time. The impact of home Internet access by doctors' must be addressed simultaneously. Secondly, all five of the needs raised in Chapter 2 can be met to a greater or lesser extent by implementing recommendations that are mostly inexpensive, but which should be implemented in a coordinated and planned manner, although the urgency of the situation demands an immediate response. Thirdly, the role of the patient as partner must be recognised as crucial to effective Internet usage.

## 11.4 The contribution of this thesis

### 11.4.1 Completing the global picture

Until this thesis, detailed knowledge of South African Primary Care doctors' Internet usage has not been known. This has been in stark contrast to countries in Europe and North America, where such surveys are conducted regularly, and doctors and patients reap the benefits of this knowledge. Because of this study, information about usage patterns and factors affecting usage are known, and can contribute to the delivery of quality health care in South Africa.

### 11.4.2 Contributing to explanations

The qualitative study went further than merely describing the situation on the ground, and also provided explanations for many seemingly incongruous results. It also highlighted the factors affecting non-usage so that, if usage is to be encouraged, the efforts can be targeted, and time, effort and money is not wasted on solving problems that are either irrelevant or have very little direct bearing on the central issues.

### 11.4.3 Activity Systems Model

The thesis has highlighted the value of ASM in understanding the processes involved in the use of the Internet by South African Primary Care doctors in the delivery of health care. It has also noted extensions that may be added to the model so that the understanding may be more complete.

### 11.4.4 Diffusion of Innovations

The thesis has confirmed the value of DoI as a descriptive and predictive tool, although it has also indicated areas of weakness.

### 11.4.5 A new model

The major thrust of this thesis has been the development of a new model of health care interactions in the information age, as shown in Figure 8-9 and supported by Figures 8-11 and 8-12. It combines the pertinent aspects of both ASM and DoI, but goes further. Firstly, it indicates that the personal space of the subject is being included in the interactions. Secondly, it indicates the importance of the Internet's diffusion amongst patients and colleagues to these interactions. Thirdly, and most importantly, it shows the impact of these developments when combined with the strengthening of the patient as partner. The end result is a model of health care that is very different from what has previously been seen, and which has to be taken into account when planning for and practicing medicine. The model also indicates the "broken" scenario of inadequate health care delivery that may result if these elements are not accommodated.

### 11.4.6 Practical application

The thesis has provided practical solutions to the identified problems, and recommendations for implementation. These solutions have credibility because they are not whimsical thoughts, but are based on theoretical frameworks grounded in the data, viewed within the international context, and based on the identified processes and mechanisms.

### 11.4.7 Further research

Finally, during the course of the study, other issues were raised, and these were formulated into questions that can be used as launching pads for further research.

## 11.5 Conclusion

This thesis began with a discussion of medical informatics. From that discussion, it was plain that, while the technology is important, the prime aim of using the technology was the improved delivery of health care to patients. This thesis has attempted to make a contribution to our knowledge and practice in the use of the Internet for this purpose.



This thesis has examined the use of the Internet by South African GPs. It has begun by identifying five areas of study that indicate issues crucial to the delivery of primary care, and has proposed the use of the Internet to solve the problems associated with these issues.

Within the context of Yrjö Engeström's Activity Systems Model and Everett Rogers' Diffusion of Innovations, the study performed an international review, a survey of

South African Primary Care doctors, and a series of interviews and focus groups using Grounded Theory to provide explanations for the survey results.

The resultant descriptive data have allowed information regarding South Africa to be incorporated into the global picture of Internet usage by doctors. The study has sought reasons for the usage patterns, and has analysed and interpreted the data in the light of Engeström's Activity Systems Model and Rogers' Diffusion of Innovations.

In answering the research questions, it has shown the strength of both theories, has suggested adaptations to meet weaknesses, has suggested a new model of health care interactions in the information age, and has supplied practical application recommendations for using the Internet in South African Primary Care.

By viewing the diffusion of the Internet amongst South African Primary Care doctors through the Activity Systems Model, this thesis has aimed at contributing to the field of medical informatics so that improved health care can be delivered to patients by South African Primary Care doctors.

# APPENDICES

# Appendix 1: Piloting of the Questionnaire

Before piloting the questionnaire, it was viewed by two former GPs who are currently academics, and one GP working in the community and in an academic environment. The questionnaire was then piloted with 4 practising GPs. As far as possible the GPs ranged in the demographics in order gain a broad range of responses. They were requested to complete the questionnaire, and also to comment of the structure and design.

*Table1: Demographics of Pilot participants*

| Sex | Age | Role | Location | Access from Practice | Usage | Length of use |
|---|---|---|---|---|---|---|
| Male | 53 | Family physician | Private practice | Yes | Daily | 7 yrs + |
| Female | 35 | Family physician / Academic | Clinic / public hospital | No | 2-3 x per week | 7 yrs + |
| Female | 43 | Family physician / Academic | Clinic / Academic | No | Daily | 7 yrs + |
| Male | | Family physician | Private practice | Yes | | |

For the most part, the questionnaire remained as it was before the Pilot. Given the responses from the participants, however, the following changes were made:

- On length of Internet usage (Question 13), the original questionnaire stopped at 7+ years. Given the time elapsed since the development of the World Wide Web, and the high amount of usage in the Pilot, this range was increased.
- The question asking about beliefs regarding the use of email (Question 26) was originally placed 3 questions later. In spite of instructions, this question was being answered only if people had access from their place of work. As this

question was designed to determine views of non-users also, it was moved to the top of the section in the hope that it would be answered by all participants.

- Originally the reference to place of practice (Question 10) referred to place of work. This became confusing for those who worked in both universities and clinics. As the main goal was to look at access from the place of practice, this was made more specific.
- **N/A** options were added to questions 35 and 36.
- Question 13, option 17 was originally just **VoIP**, but participants who used this did not know the technical term, so it was changed to **Internet Telephone (VoIP)**
- **Independent Practice Assoc (IPA)** was added to question 17.

# Appendix 2: Questionnaire Cover Letter

(Text Overleaf)

29 June 2006

Dear Doctor

**Survey Form: An examination of the South African primary care doctor's current and predicted Internet use**

You are kindly invited to participate in a nation-wide *15-minute* survey examining doctors' use of the Internet. This study is being conducted as part of a PhD research project to be completed through the University of Cape Town's Faculty of Health Sciences. Please participate in this survey **even if you do not use the Internet**. As a token of our appreciation for your participation and time, we will enter your name into a draw to win one of three 1 Gb USB flash disks valued at R500.00 each.

International studies indicate a rapidly increasing use of the Internet by doctors. These studies examine usage patterns, and factors influencing usage. They provide insight into doctors' resources and behavioural trends, and contribute to better health care in those countries.

While we can learn from foreign studies, the South African situation remains largely unknown. Accurate information is needed concerning the role of the Internet, and to improve our understanding of the impact of the Internet on health and health care in South Africa.

Your participation in this study will allow policy-makers to better understand, and respond to, the Internet needs of doctors. It also will allow Universities to better prepare doctors to care for their patients, by providing useful background for designing undergraduate curricula and for structuring continuing professional development courses for doctors already in practice.

You are one of 2 600 doctors randomly selected from the South African Medical Association (SAMA) database to whom the enclosed documents have been sent. Please complete the documents within two-three weeks of receipt, and return them in the self-addressed envelope. *Alternatively, you may complete it online at:* http://survey.cet.uct.ac.za/index.php?sid=1
**User name**: doctor **Password**: internet

The questionnaire should take about 15 minutes to complete, depending upon your particular circumstances. All information received will be treated in strict confidence.

We thank you for your time in completing this questionnaire, and greatly value your contribution to this study.

| | | |
|---|---|---|
| Ken Masters | Dr Dick Ng'ambi | Prof Gail Todd |
| Senior Lecturer, EDU | Senior Lecturer | HOD: Dermatology |
| Faculty of Health Sciences | CHED | Faculty of Health Sciences |
| University of Cape Town | University of Cape Town | University of Cape Town |
| (Researcher) | (Supervisor) | (Co-Supervisor) |

# Appendix 3: Questionnaire Brochure

(Overleaf)

**BROCHURE FOR STUDY OF DOCTORS' USE OF THE INTERNET**

**1. Background**

Internationally, studies on the use of Information Technology (IT) in the area of health care have indicated that the use of IT by medical researchers, doctors and patients is growing rapidly. Perhaps the single most significant development in IT has been the Internet, which has allowed consumers and providers of health care equal access to health-related information. Although the most common use of the Internet is the World Wide Web, and one often thinks of using the Internet as passively browsing Web pages, this is only one aspect of the Internet. A second area includes electronic mail (e-mail), itself incorporating mailing lists. There are also an untold number of bulletin boards, chat rooms, wikis, blogs, and other interactive sites through which communication occurs.

Developments have reached the stage where it is essential to investigate the opportunities, problems and trends associated with Internet use in Primary Care at both international and national levels. Armed with this information, we will be able to make short-term predictions about the Internet needs of doctors in South Africa.

**2. Expected benefits to you and to others**

The study is being conducted as part of a PhD project. It will provide needed information on current and future Internet use by Primary Care doctors, and will be published in peer-reviewed journals. The information will be available to policy-makers, and to those designing Health Sciences' curricula, thus ensuring that doctors in training are adequately prepared for future practice and patient care. All doctors participating in the survey will be eligible to participate in a draw to win one of three 1 Gb USB Flash Disks, with a value of R500.00 each.

**3. Costs to you resulting from participation in this study**

3.1 <u>Completion of the questionnaire</u>. The postal questionnaire has been sent to you with a self-addressed, stamped envelope, so you should not have to pay for postage to return the questionnaire. If you elect to participate using the online questionnaire, then you will be liable for your normal Internet costs.

3.2 <u>Participation in the interview.</u> If you elect to participate in the interview study, you will be paid a nominal amount of R200.00 for participating in the interview. As this interview will be held in a location of your choosing (for example, your office), there should be no further costs to you.

3.3 <u>Participation in a focus group</u>. If you elect to participate in the focus group study, you will be paid a nominal amount of R200.00 for participating in the focus group, and a further R150.00 to cover transport and other expenses. As these focus group participants will be expected to travel, proximity to centres will be an influencing factor in your agreeing to participate. You will be served light snacks at no charge.

Please see the consent form for further information.

Thank you for your participation in this study.

Ken Masters
June 2006

# Appendix 4: Questionnaire Consent Form

(Overleaf)

**CONSENT TO PARTICIPATE IN A STUDY OF DOCTORS' USE OF THE INTERNET**

**1. Title of research project**
An examination of the South African primary care doctor's current and predicted Internet use

**2. Name of researcher**
Mr Kenneth Masters, Education Development Unit, Faculty of Health Sciences, University of Cape Town

**3. Purpose of the research**
We wish to ask you to participate in an important study called "An examination of the South African primary care doctor's current and predicted Internet use"

**4. Description of the research project**
If you agree to participate in this study, you will be asked to participate **in one or more** of the following processes. You have the right to decline to participate in any of these, at any time, even after you have given your consent.

4.1 Completion of a questionnaire. This is an anonymous questionnaire which will request demographic information (e.g. age, gender) and information about the type of work you perform, your use of the Internet and your practice. At no point in the questionnaire will you be expected to divulge any identifiable information about yourself, your practice, employers, employees, patients. Although we would like all questions to be answered, you may elect not to answer any question.

The questionnaire is being sent to you as a postal questionnaire and is also available online. You may elect to complete ***either***. If you elect to complete the questionnaire online, please go to: http://survey.cet.uct.ac.za/index.php?sid=1
**User name**: doctor **Password**: internet

4.2 Participation in an interview. A small number of participating doctors will be invited to participate in an interview. This will be a 1-hour interview, in which the interviewer will pursue issues at a deeper level, allowing for more detailed responses to items in the questionnaire. Again, you will not be expected to divulge any identifiable information about yourself, your practice, employers, employees, clients or patients. Although we would like all questions to be answered, you may elect not to answer any question. If you are willing to be interviewed, please complete the relevant section at the end of this form.

4.3 Participation in a focus group. A small selection of participating doctors will be invited to participate in a focus groups discussion. These will be 2-hour gatherings of 8-10 doctors in which specific issues raised in the questionnaire will be explored in more depth with professional colleagues. This will be facilitated by one or two people involved in the study. These sessions will be audio-taped. Again, you will not be expected to divulge any identifiable information about yourself, your practice, employers, employees, clients or patients. Although we would like all questions to be answered, you may elect not to answer any question. If you are willing to participate in a focus group, please complete the relevant section at the end of this form.

### 5. Risks and discomforts of the research
This research is unlikely to cause participants any psychological or physical discomfort.

### 6. Confidentiality of information collected
In any of the studies, if you inadvertently disclose any information that you wish to have removed from the records, this will be done. All contents of the audio-taped interviews and transcripts will be accessed by the researcher and assistants only, and will at all times be regarded as confidential. All data collected and stored electronically will be secured by means of passwords, and 256-bit encryption. All survey data will be collected anonymously. Where identification material has been necessary for logistic purposes during the study, this will be destroyed when no longer required. While in existence, it will be protected through the same encryption techniques outlined above.

### 7. Voluntary nature of participation
Your participation in this study is entirely voluntary.

### 8. Documentation of the consent
One copy of this document will be kept together with our research records on this study. Please make a copy for yourself.

### 9. Contact person
You may contact the following person for answers to further questions about this research, your rights, or any other issue related to this study.

Ken Masters 021 406 6507 kam@its.uct.ac.za

### 10. Further Participation

| |
|---|
| I am willing to be interviewed: **Y / N** |

| |
|---|
| I am willing to participate in a Focus Group: **Y / N**<br>**in one of the following centres: Johannesburg Cape Town Queenstown** |

### 11. Consent of the participant
I have read [or been informed] of the information given above. I understand I may contact Mr Ken Masters on 021 406 6507 or at kam@its.uct.ac.za to address any questions I may have concerning the study. I hereby consent to participate in the study.

______________________________ ______________________________
Printed name of the participant Signature of the participant

Address:____________________________________________________

____________________________________________________________

Telephone number:_(____________)______________________________

______________________________ ______________________________
Printed name of the witness Signature of the witness

This day: ____/_____/_________ at: ______________________________
(DD MM YYYY) Place

# Appendix 5: Questionnaire

(Overleaf)

**Faculty of Health Sciences, University of Cape Town**
**Survey Form: An examination of the South African primary care doctor's current and predicted Internet use**

Ken Masters, EDU, Faculty of Health Sciences

**Instructions:**

- In this questionnaire, the "Internet" includes the World Wide Web, e-mail, electronic discussion groups, online learning and teaching, etc
- Unless otherwise stipulated, "You" refers to you, personally, rather than someone in your practice.
- Where you are asked to select from a list, please circle either the item or the number associated with that item, unless otherwise indicated.
- This questionnaire may be taken online at: http://survey.cet.uct.ac.za/index.php?sid=1
  **User name**: doctor **Password**: internet

---

**Off. Use only**

## SECTION A: DEMOGRAPHICS AND OTHER GENERAL INFORMATION

1. Age (in years):______________ 1

2. Gender (M/F):_____________ 2

3. Year of Qualification as a doctor:_________________ 3

4. Approximate (%) amount of professional time spent as:
   1. General Practitioner – Primary Care Doctor / Family Physician:_____________ 4
   2. Lecturer / academic:_____________________________________ 5
   3. Other – Please specify:___________________________________ 6

5. Approximate (%) amount of professional time spent in:
   1. Private General Practice:_______________________ 7
   2. Public Sector Clinic / Community Health Centre:_________________________ 8
   3. Public Sector Hospital:__________________ 9
   4. Company Medical Facility:_______________ 10
   5. Academic Setting (e.g. University lecturing):______________________ 11
   6. Other – Please specify:___________________ 12

6. For which of these activities does your Practice use the Internet (Select all that apply)?

| Activity | Activity | |
|---|---|---|
| 1. Professional email to patients | 2. Professional email to colleagues | 13,14 |
| 3. Travel information / arrangements | 4. Filing medical aid / insurance claims | 15,16 |
| 5. Obtaining / transferring laboratory results | 6. Filling prescriptions / orders | 17,18 |
| 7. Searching for Drug Information | 8. Other (specify): | 19,20 |

**7.** Please give the approximate (%) amount of professional time spent in:

| Urban Area: | Rural Area: | |
|---|---|---|
| Peri-Urban informal settlement: | | 21,22 23 |

**8.** Number of General Practitioners in your practice:_________________ 24

9. If you spend time in private practice, does the private practice have a Web page?
(**Y / N / Don't know / I do not spend time in private practice**) 25

## SECTION B: INTERNET ACCESS AND USAGE

Off. Use only

10. If you **DO** have Internet access at your place of practice, what type of access do you have (indicate all that apply)?

| | |
|---|---|
| 1. Normal telephone Dial-up (56Kb modem) | 2. Broadband |
| 3. A network connection | 4. Laptop (WiFi/GPRS etc) |
| 5. Other Mobile Device (e.g. PDA, cell phone) | 6. Don't know |
| 7. Other (Please indicate if you know): | |

26,27, 28,29, 30,31 32

**11.** If you **DO NOT** have Internet access at your place of practice, would you like to have?

**<u>Y / N N/A</u>** 33

*Please answer question 12 to 21 if you* ***DO*** *use the Internet, including e-mail <u>from any location</u>. (If you* ***DO NOT*** *use the Internet at all, then please go to question 22)*

12. Approximately how much of your Internet time (%) is spent accessing from:

| | |
|---|---|
| 1. Home:_________________ | 2. Clinical Practice:__________ |
| 3. Hospital:______________ | 4. Other (specify):_____________________ |

34,35 36,37

13. For how long have you been using the Internet?

| | | | | | |
|---|---|---|---|---|---|
| 1. < 1 year | 2. 1 year | 3. 2 years | 4. 3 years | 5. 4 years | 6. 5 years |
| 7. 6 years | 8. 7 years | 9. 8 years | 10. 9 years | 11. 10 years or more | |

38

14. For which of these activities do you use the Internet (indicate all that apply)?

| **Activity** | **Activity** |
|---|---|
| 1. Personal email | 2. Professional email to colleagues |
| 3. Professional email to patients | 4. Reading online journals |
| 5. Visiting Professional Bodies' Websites | 6. Filing medical aid / insurance claims |
| 7. Obtaining / transferring laboratory results | 8. Collecting Financial News |
| 9. Obtaining / transferring medical records | 10. Filling prescriptions / orders |
| 11. Searching for patient-specific information (diagnostic assistance) | 12. Looking for sites to recommend to patients |
| 13. Attend online Continuing Medical Education (CME) Courses / Conferences | 14. Communication with Professional Bodies |
| 15. Teaching | 16. Telemedicine |
| 17. Internet Telephone (VoIP) | 18. Travel information / arrangements |
| 19. Searching for Drug Information | 20. Participating in clinical trials |
| 21. Collecting Conference Information | 22. Attend online conferences |
| 23. Online banking | 24. Personal Purchasing / Shopping |
| 25. Entertainment | 26. Other:_________________________ |

39,40, 41,42, 43,44, 45,46, 47,48, 49,50, 51,52, 53,54, 55,56, 57,58, 59,60, 61,62 63,64

15. In an average week, approximately how many hours do you spend on the Internet?

| | | | | |
|---|---|---|---|---|
| 1. 1-4 | 2. 5-10 | 3. 11-15 | 4. 16-20 | 5. 21 or more |

65

16. How often do you use the Internet?

| | | |
|---|---|---|
| 1. Daily | 2. 2-3 times per week | 3. Once a week |
| 4. 2-3 times per month | 5. Once a month | 6. Less frequently |

66

17. Over the past 6 months, has your usage of the Internet:

| | | |
|---|---|---|
| 1. Increased | 2. Decreased | 3. Remained the same |

67

18. Which web sites have you visited in the past 3 months (indicate all that apply)?

| | | |
|---|---|---|
| Medline | Medscape | Physicians Online |
| PubMed | WebMD | MD Consult |
| Disc. Health | Google (for Searching) | Google Scholar |
| Amazon | Yahoo (for Searching) | Another Search Engine |
| A travel site | An Airline | Any online newspaper |
| CNN | SABC | MNet |
| eTV | Cell phone / provider | Other foreign news station |
| HPCSA | Medical Aid Site | A Pharmaceutical Co. |
| Your Bank | Other Medical sites | Independent Practice Assoc (IPA) |
| SAMA | Telkom | No Web pages visited |
| Other: | | |

19. How often do you refer other doctors to Web sites or other Internet technologies?

| | | | | |
|---|---|---|---|---|
| 1. Daily | 2. Weekly | 3. Monthly | 4. Less than monthly | 5. Never |

20. How often do other doctors refer you to Web sites or other Internet technologies?

| | | | | |
|---|---|---|---|---|
| 1. Daily | 2. Weekly | 3. Monthly | 4. Less than monthly | 5. Never |

21. What has been the impact of your use of the Internet on your practice of medicine?

| | | | | |
|---|---|---|---|---|
| Significantly Improve | Improve | No impact | Worsen | Significantly Worsen |

*Please answer Questions 22 to 25 if you **DO NOT** use the Internet at all. If you **DO** use the Internet, please move to Question 26.*

22. What are your reasons for NOT using the Internet (indicate all that apply)?

| | |
|---|---|
| 1. No access at clinical practice | 2. Novice or inexperienced user |
| 3. Not aware of good sites | 4. No valuable content |
| 5. Connection too slow | 6. No time |
| 7. Workload too great | 8. Too expensive |
| 9. Lack of reimbursement | 10. No computers in examining rooms |
| 11. Cost outweighs benefits | 12. Navigation or searching difficulties |
| 13. Too much information to scan | 14. Specific information not available |
| 15. Software incompatibilities/problems | 16. Lack of interest |
| 17. Other (Please specify):______________________________ | |

23. What would motivate you to use the Internet (indicate all that apply)?

| | |
|---|---|
| 1. Financial incentives | 2. Information relevant to my practice |
| 3. Remuneration for web-based clinical activities | 4. Ability to evaluate the effectiveness of using the tool |
| 5. Recommendations from credible sources | 6. Links to Continuing Medical Education |
| 7. If I had training | 8. If I had technical support |
| 9. If I could try it free for 2 months | 10. Nothing would motivate me to use it |
| 11. Other: (Please specify):______________________________ | |

24. Do you anticipate having Internet access within the next 12 months? **Y / N**

25. If you had access, would you communicate with your patients through email? **Y / N**

**Off. Use only**

68,69,70
71,72,73
74,75,76
77,78,79
80,81,82
83,84,85
86,87,88
89,90,91
92,93,94
95,96,97
98
99
00
01
02,03
03,04
05,06
07,08,
09,10
11,12
13,14
15,16
17,18
19,20

## SECTION C: PATIENTS AND THE INTERNET

26. *Please answer these questions irrespective of whether or not you communicate with patients via email*. I believe that communicating with patients via email (indicate all that apply):

| | | Off. Use only |
|---|---|---|
| 1. saves time on answering simple questions | 2. increases general accessibility of doctors to patients | 32,33 |
| 3. wastes time | 4. saves time on telephone calls | 34,35 |
| 5. saves money | 6. increases patient satisfaction | 36,37 |
| 7. allows one to deliver better care | 8. improves overall efficiency | 38,39, |
| 9. increases workload | 10. decreases workload | 40,41, |
| 11. allows for greater communication | 12. causes confusion | 42,43 |
| 13. Other (please specify):_______________________________________________ | | 44 |

27. How often do you refer patients to Web sites?

| | | | |
|---|---|---|---|
| 1. Daily | 2. Weekly | 3. Monthly | |
| 4. Less than monthly | 5. Never | | 45 |

28. How often do patients present you with medical information obtained from the Internet?

| | | |
|---|---|---|
| 1. Daily | 2. Weekly | 3. Monthly |
| 4. Less than monthly | 5. Never | |

46

29. If patients bring you information from the Internet:
   a) Approximately what percentage of patients have interpreted it correctly?________
   b) Of the material that is brought from the Internet, what percentage of it is information you *did not* already know?_____ 47
   c) Have you found that the length of the consultation increases because of it? **Y / N** 48
   d) Have you found that the quality of the consultation increases because of it? **Y / N** 49
   e) In general, how do you feel about patients bringing information from the Internet? 50
   **(Positive / Neutral / Negative**)

51

*Please answer Questions 30 to 37 if you **DO** communicate via email with your patients or if they communicate with you through email. If you have **NO** email communication with your patients, please move to Question 38*

**30.** With approximately what percentage of your patients do you communicate via email?_______

52

31. For which of the following activities do you use e-mail (indicate all that apply)?

| | | Off. Use only |
|---|---|---|
| 1. prescription refills | 2. sending test results | |
| 3. receive test results | 4. scheduling appointments | |
| 5. claim submission | 6. evaluating a *new symptom* | 53,54 |
| 7. answering a question about disease management | 8. discussing a mental health issue | 55,56 / 57,58 |
| 9. adjusting medication dosage | | 59,60 |
| 10. Other: (please specify):_______________________________________________ | | |

61
62

Off Use only

32. Have you received information from patients' partners/spouses via e-mail that they believed your patient would be too embarrassed to give you? **Y / N** 63

33. Have patients asked questions via email that they forgot to ask during consultation? **Y/ N** 64

34. Who usually initiates email communication? **You / Patient / Both equally** 65

35. When a patient initiates, does s/he usually ask permission? **Y / N / N/A** 66

36. When you initiate, do you usually ask permission? **Y / N / N/A** 67

37. Would you *increase* your email communication with patients if (indicate all that apply)

| | |
|---|---|
| 1. Costs were reduced | 2. You had more time |
| 3. Your workload were reduced | 4. Benefits were clearer |
| 5. Liability issues were resolved | 6. You were reimbursed |
| 7. You had greater technical skills | 8. Security / confidentiality issues were resolved |
| 9. You could be sure that it would not replace patient consultations | 10. Patients' privacy problems were resolved |
| 11. More patients had email | 12. Patients requested it |
| 13. You saw it used more effectively | 14. Your Internet access was improved |
| 15. Other: (please specify):________________________________ | |

68,69
70,71
72,73
74,75
76,77
78,79
80,81
82,83

38. If you **DO NOT** use email with patients, what are the reasons (indicate all that apply)

| | |
|---|---|
| 1. No email access at all | 2. No easy email access |
| 3. Cost | 4. Time (too many e-mails) |
| 5. Adds to workload | 6. Benefits not clear |
| 7. Liability issues | 8. Lack of reimbursement |
| 9. Lack of knowledge | 10. Security / confidentiality doubts |
| 11. It replaces personal visits | 12. Patients' privacy problems |
| 13. Too few patients with email | 14. Never been requested |
| 15. Have never seen it used effectively | 16. Cannot try without commitment |
| 17. Other: (please specify):________________________________ | |

84,85
86,87
88,89
90,91
92,93
94,95
96,97
98,99
00

39. Please feel free to add any further comments about this subject: 01

Thank you very much for completing this survey.

Ken Masters
Faculty of Health Sciences
University of Cape Town

# Appendix 6: Calculation of Sample Size

**Basis of the calculation**

The aim of the study is to estimate the percentage of GPs using the internet for different purposes. Estimates will be made for all GPs on the register, as well as for various subgroups, described below.

We wish to estimate, with 95% probability, any percentage to within 5% of the 'true' population value. i.e. the widest 95% confidence interval will be ± 5%

The width of a 95% confidence interval is given by the formula

estimated percentage ± 1.96 Standard Errors (SEs)

The SE of any estimated percentage is $\sqrt{[(p)(100 - p) / N]}$ where p is the estimated percentage and N is the sample size.

So we need $1.96 \sqrt{[(p)(100-p) / N]} = 5$

Therefore $1.96^2 (p)(100-p) = 25 N$

The largest possible sample size required would occur when p=50%

In this case, $1.96^2 (50)(50)/25 = N$, and N=385

i.e. to achieve a 95% confidence interval no greater than 5%, a sample size of 385 is required in any sub-group of interest.

**Sub-groups**

A reading of the literature, and a knowledge of the environment leads one to believe that internet usage might be associated with location (metropolitan vs. non-metropolitan), age, and sex.

We will group age into (i) less than and including 35 years, and (ii) above 35 years. 35 has been chosen as the cut-off point for two reasons. Firstly, it is the most common division found in the literature. Secondly, given an average graduation age of 24, only students aged 35 or less would have graduated after1994. 1994 is the year of the first World Wide Web Conference at CERN, Geneva, as is widely taken as the year in which the Web came of age.

Based on information from SAMS, the proportion of GPs falling into the subgroups of interest will be: metropolitan 70%, non-metropolitan 30%; less than and including 35 years 56%, above 35 years 44%; male 70%, female 30%. (However, the proportion of females is growing).

So, the smallest sub-group is likely to be non-metropolitan doctors (30%).

From the literature, response rates range from between 5% and 80%. This is an area of unpredictability. A response rate of 50% has been assumed.

**Final calculation**

Because we are assuming a 50% return we need 385x2 = 770 GPs from non-metropolitan areas.

Finally, because non-metropolitan doctors constitute 30% of our population, we therefore need a total sample size of 770 x (100/30) = 2567 GPs. This is rounded up to **2600**.

# Appendix 7: Questions and triggers used in the Focus Groups and Interviews.

Note that, because of the constant comparative method and time constraints, not all questions were put to all participants. In addition, questions were modified to suit participants' particular situations, and also based on replies to previous question.

### 1. Improving Medical Practice with the Internet (10-15 mins)

You said in the survey that the use of Internet had improved (or significantly improved) your practice of medicine. How <u>does</u> the use of the Internet improve <u>your</u> practice of medicine?

In the survey, 75% of the doctors who participated in the survey said that the Internet had improved or significantly improved their practice of medicine. In addition to what you've said, what else do you know of that doctors do with the Internet that improves their practice of medicine?

Triggers and others:

- Practice management, billing, etc,
- If not a user: Would you use the Internet more if you had time?
- [if s/he mentions research] Describe the typical process that you would go through if researching a topic?
- Do you think there is a problem amongst GP with lack of expertise and training on the use of the Internet?
- What happens to those who don't know how to use it?
- Why do you think they don't use it?
- What is the impact on their practice?

### 2. Access Patterns: Location of Internet Access

Only 72% of the GPs who access the Internet do so from clinical practice or hospital, while 82% of them access it from home. Why is this? Why do more access it from home than from work?

- Do you have a PC in your rooms? Even if you had a PC in your rooms, would you use it to access the Internet during a consultation? If not, why not? If you do, do you use it for consultations? Describe typically how you use it during consultations.

Do you use it from home? What are your typical activities on the Internet from home usage?

### 3. Access Patterns: Age

One result was that GPs over 50 access the Internet more frequently, though not necessarily for longer, than the other GPs. Do you have any idea why that might be?

### 4. Access Patterns: Gender

There is no difference in the percentages of male and female doctors who use the Internet, but males spend more <u>time</u> on the Internet in general, and also spend more time on it at <u>work</u> than females do.

Question this:

Conversely, home usage is different. Although they have equal access at home, female doctors spend more time on the Internet from home than male do. Why is it that female doctors spend more time on the Internet from home than male doctors do?

### 5. Access Patterns: Size of Practice

Practices were classified as small if they had 1 or 2 doctors; and large if they had 3 or more. In large practices, more doctors have access to the Internet from work, but they don't spend more time on the Internet than doctors in small practices. Why is that?

There is some difference between the large and small practices in their accessing of websites. Doctors in large practices access travel sites and airlines, professional bodies more, internet telephone more, and attend online conferences more;

Doctors in small practice tended to file more online medical aid claims, more professional bodies collect conference information more, and visit WebMD, Medline and CNN. Why is this?

### 6. Patients and the Internet

Patients who find information on the Internet and bring it to the consulting room, or refer to it when you're with them in hospital. Tell me about that, and the issues it raises.

Triggers:

- quality of material on the Internet
- length of consultation
- quality of consultation
- so on the whole, how do you feel about patients bringing?
- Do patients bring information from elsewhere? is there a different in the type of patient, and in the type of information coming from the net and coming from these other sources?
- How does affect the patient-doctor relationship?
- What is the value of Internet patient education sites? Do you look for and recommend them?
- Tell me about the type of patient who does this?

44% of GPs said that patients bringing material improved the quality of the consultation, yet only 31% of the GPs said that they felt positive about patients bringing material. Now, if it's improving the quality of the consultation, why are so few doctors positive about it?

- Have you had colleagues talk about it?

IF TIME: Similarly that a large number had said that the material was new to them, yet so few are positive. [57% said that it increased the length of the consultation]

### 7. Patients and email

Communicating with patients via email. What are the issues? How do you feel about that?

- what is the difference between telephone and email?
- Do you draw the line at particular things? How is this determined?
- Is cost a problem?
- Do patients sms you?
- What about charging? Has that ever come into your mind?
- -Anytime access expectation?

### 8. SA and the rest of the world

The Internet usage figures and patterns for GPs in South Africa closely resemble those in developed countries. Given that we don't have anywhere near the same level of technology, and that therefore there are greater hurdles to overcome, how would you account for the fact that South African doctors use the Internet as much as doctors in the developed world and for much the same things?

[refer to this piece if it isn't addressed directly]

**9. Would like to do but can't**

What would you like to do on the Internet, but can't, and why not?

**10. The future**

How do you see the future of Internet usage by South African GPs in the next 10 years?

What would you like to see happening in terms of the Internet and healthcare delivery?

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Check to see, if time, that these have been covered.

- The response rate to the survey was just on 10%. Why do you think that the response rate was so low? Why did you respond? Particularly from doctors younger than 35.

- Many of the doctors, including yourself, who have Internet access, did not do the questionnaire online: why is that?

- trigger: if the survey had arrived as a personal email, with a clickable link to a web-based survey form, would you have taken it online?]

- Google was the site used most often, yet Google Scholar was amongst the lowest used sites. Why are so few doctors using Google Scholar?

# Appendix 8: Further Quotations moved from the Qualitative data.

These quotations, taken from focus group and interview participants, have been moved from the main text so as not to interrupt the flow of the discussion. The quotations have been referenced back to the pertinent sections.

**From Section 6.5.1.1 Time**

*Ja, I mean if you are seeing 30 to 40 patients a day, where the hell do you have time to go to the Internet? So I have Internet at my office and I have it at my house…. Ja because it's night and everybody sleeps and everybody is leaving me alone, I can do my work I mean I have 30, 40 patients a day I still have to go to the hospital and do my rounds. The hospital is 35 km away from me it takes me half an hour there and half an hour back that's an hour out of my day. It takes me about a hour to do my job my rounds I still have to do 2 hours today here with patients, before I go home. [Inv002]*

*Well, I don't think everyone really has time to access it at work, whereas, after hours, you know, you've got bills to pay you can actually sit down to do a task, but at work you see patients, you don't have time to take out of your day to sit [Inv003]*

*[At home] you have more leisurely time to actually sit down and look up what you are needing to look up, that you are not on the job. [Inv010]*

*I have no time during the day to sit on Internet and look for anything. I have no time. [Inv016]*

*I used it a lot actually [overseas], but in South Africa you don't have time for things like that because you are just too busy, I mean you're really just frantically too busy…A doctor in a day hospital, for example, will just, he will battle to find, he will be able to make time I'm sure, maybe in the afternoons, but in the mornings it will just be completely, it will be impossible if you have got to see 40, 50, 60 patients a day sometimes, it's just, don't have time [Inv017]*

*I think also from a time point of view, you know, when the consultations are busy, then you are only going to have the evenings or weekends to work on the Internet. [Inv018]*

**From Section 6.5.1.2 Lack of access from work**

*Some doctors are operating from small rooms which are very inadequate...In some peripheral surgeries, they are consisting of 2, 3 rooms there is staff and patients and everybody, there is no place for a computer. [Inv016]*

*Yeah, it is very difficult to access, to use a computer at work, but one other thing that I realise, even if you have a lunch hour, maybe you thought during this lunch hour you could use it for, to check the Internet, in the public area, so you, you will think – oh, I can go and check the Internet, you won't access it, otherwise in the public, but maybe in a private where you have your own computer. [JHBFG-03]*

**From Section 6.5.1.3: The workplace discourages usage**

*Often at the workplace, people don't think that doctors should spend time, so much time sitting on the Internet or using the Internet sometimes their employers, the seniors think that people who are sitting on the Internet and not using information, maybe they are doing their personal things, like checking their personal emails, and downloading stuff for their personal use and not directly related to their work. Inv[007]*

*It's very useful, the Internet, but accessibility of it is not there at all. You find yourself in the whole hospital amongst a lot of doctors who share one computer with one password, so – and that password – it's, it belongs to one person, a senior to you, it makes it much more difficult, hence the management of the patients will be little bit different – you won't be moving with time because the system is dynamic. [JHBFG-04]*

**From Section 6.5.2 Internet activities from home**

*My banking, you know I don't have time to do that or check anything, what's happening, coming in and out of the office, anything. At night, when I go home, my children are asleep I go and check my banking, what's been paid. [Inv002]*

*[From home,] I use it for emails, for personal communication over the Internet. I use it for Internet telephoning as well, because international calls are much more cheaper over the Internet so I'm using a data call instead of a regular telephone call. Then I use it for downloading various educational material over the Internet. [Inv007]*

*Email and looking up things I suppose, looking up different information… It's work related and related to interests. [Inv012]*

*email, banking, downloading music. [Inv013]*

*Most of the time it's just email, could be business-related and personal emails where you're just corresponding, and then if you need to research a topic, if you have a presentation or something you need some background information and entertainment now and again, that's about it. [Inv017]*

*If you've got a patient with a strange problem, you could say to them, look, this is a little bit beyond me or this is something I need to read up a bit more on, I'll give you a call in a day's time, and go home and read up on something unusual. [Inv018]*

**From Section 6.5.3.3 Location of Work (Urban, Rural, Per-urban)**

*Because lots of the hospitals don't allow access to the doctors. Like in our hospital we have computers, and some of the administration staff have access to the Internet, but none of our hospital, the clinical staff, have access to the Internet. [Inv011]*
*Because you don't have Internet there [in peri-urban areas]. [Inv012]*

*[Peri-urban doctors] are just running all day to satisfy the demand with the number of people that need to see them during the day, so it will be in the evenings that they will follow up with anything strange they saw in the daytime, or when they are off work duty. I don't think there is any time for Internet to be involved in consultations,*

*when each consultation takes just a few minutes, and you've got this long queue you want to try and get through before they close the gates. [Inv018]*

*The reason they access it from home rather than work… is because they don't have it at work. [Inv019]*

**From Section 6.5.3.5 PGPs: Size of practice**

*In larger practices, some practices have 12, 15 doctors, it's a laugh at your monthly subscription for your ADSL. [Inv001]*

*Ja, I know the bigger practices generally have got bigger, you know we moved from a small practice which had no computer facility, I think the bigger practices are all computerised, I know we moved in, we've got our own chap in the company who does all the computers, so the whole thing is geared electronically, it's now wired in, they are linked in with the pharmacies, they have got an electronic strip, information stuff, so I think the bigger systems, the bigger group practices are more electronically geared, I think their facilities are more extensive. [Inv008]*

**From Section 6.6.2.1 Age**

*They are physically less active, that they can't, like, take part in more active sports, if they're over the age of 50 and maybe some of them are having some physical problems which keeps them away from spending more active sport activities, so they have more time available at home and more time on the Internet. [Inv007]*

*A lot of young doctors go for seeing large quantity of patients, you know there are these guys that see 50, 60 patients a day or more.  Invariably they are youngsters and that might be part of the reason. [Inv009]*

*I think the older ones probably have more difficulty, you know most of the new doctors I think that, you know when you were at university you got training as well in how to use the computer, and you had to use the Internet as well. [Inv011]*

*I don't know, maybe they have forgotten more. [Inv012]*

*I think there are a lot of GPs that might have allowed complacency to kind of just erode a little bit at their knowledge, and I think that erosion of their knowledge probably erodes at their confidence a bit, and they might just be, you know, maybe a little bit insecure and just checking that, I am still up to date and that my guidelines are still correct and all that.  [Inv017]*



**From Section 6.6.2.2 Gender**

*Probably because they spend less time at work where they, I know we have got three ladies who work with us, and they generally are wanting to get home and see their families, I think there is that aspect where their any free time they have got they are at home. [Inv008]*

*Female doctors have children and they have to fetch the kids at school and what have you, during the day time and they catch up at night, whereas the males might do the same thing during the day time. [Inv009]*

*Depending on their roles that again they might be able to make time for themselves and actually do it from the home. [Inv010]*

*They combine it with their household activities, in the sense that, maybe more domestic approach to the whole situation in the sense that, they may have a home computer maybe doing the cooking and watching the net at the same time. [Inv015]*

*I would think it's because there's a different profile of doctor between male and female. Um, females tend to want to juggle their family and work and whatever, and they tend to have slightly more sessional type of jobs for a different kind of job, even in GP Practice. I look at the females that work for me – they want to work certain hours. They don't want to work at night and they juggle it around their life, whereas males are fortunate in that they can work different hours so they work different hours. [CPTFG-02]*

**From Section 6.6.2.5 PGPs: Size of practice**

*I think that in large practices doctors often consult with each other because my most frequent reason for being on the Internet is to look up something I am not sure about to try and find out about something, and if I had a colleague next door I would just phone him or go next door and ask him. [Inv005]*

*They talk to their colleagues, you know. If they want something, they feel they can get the information from their colleagues. [Inv009]*

*I suppose they've got their colleagues that they can confer with, if you are talking about information and guidance, they've got people to confer with rather than going onto the Internet. [Inv010]*

*Doctors in small practices are doing their claiming online. Maybe in large practices there enough admin support to do that. [Inv005]*

*They have more sources available, they have people who can do other things for them, like billing and other things, which maybe it's not possible for the doctors in the very small practice . [Inv007]*

*also possibly that doctors in small practices might be less busy and have more time. [Inv005]*

**From Section 6.9.1: General Research**

*But then also, getting the most up-to-date, I can access PubMed from my Rooms from because we've got a whole network of computers so anybody can access it there you just quickly want to. [CPTFG-01]*

*I get about 4 or 5 different international sources of information on a daily basis. [Inv004]*

*Primarily, just in information gathering. That would be the primary thing, getting what general protocols are out there, keeping in touch with cutting-edge developments in my field which is emergency medicine. [Inv010]*

*Well, what we do at the hospital we work at, every Thursday we are having sort of information and teaching lectures, and then I usually try to go on some of the websites like PubMed or Health24 one of those websites, to gather more information. [Inv011]*

*The Net is the easiest way to access information with regards medical issues and other issues if you're interested. [Inv015]*

**From Section 6.9.2: Disease management**

*I can access the information while the patient is with me and give the patient the information. [Inv001]*

*I do use it many times when I need some information about the condition, about the management of the specific condition, so I go to the Internet and search it. [Inv007]*

*I am looking for some certain things, you know, that's very convenient because I get information about this in medical journals, but I'm not always agreeing with what is written there. So I'm on Internet, you have choice of different opinions. Let's say if you look for diabetic diet and diets in diabetics, you know, or gout patients, you'll see, the advices are different, and then I'm looking to see, is my advice is correct or do I have to add something or whatever. [Inv016]*

*Now and then, I might see something I just like to know a little bit more about the condition, every now and again, there was something weird that I just had completely* *no idea what, well I mean, just something like Lyme's Disease, you don't see that in South Africa really. [Inv017]*

*In terms of availability of information, like being able to look up medical scenarios and information on the Internet, it's much easier than trying to find that sort of information on papers, so it's much more accessible. [Inv019]*

**From Section 6.9.3: Online journals and CME**

*I mean, you know we can do some of our CME, continued medical education, through the email you know basically they send you the stuff by mail you download it. [Inv002]*

*and something I need to look up quickly and also in my free time I can go and research the latest coming out treatment, protocol and not just for HIV obviously there are other things we are involved in, staying up to date with CME for medicine, reading the latest journal articles but particularly for HIV. [Inv003]*

*the other way is to retrieve to get data on e-books, try and get information rather to try go to books and journal articles. [Inv004]*

*Ja, it has actually changed quite a lot I have recently starting studying at [a local University] on [a learning management system] ... Well I think in the first instance it's helping me to study because I'm searching on line for journal articles and that sort of thing for my degree. [Inv005]*

*I am receiving articles and reading medical journals through Internet, and specially those overseas ones which are too costly for me usually to buy [Inv016]*

**From Section 6.9.4: Other themes**

*Well I'm dealing a lot with HIV patients and I'm basically not a specialist, but I have Internet at work, if I have a difficult problem that I can't really refer to anyone else, I can go and check like if it's a complex drug interaction…[Inv003]*

*the medication was different over there [abroad], so I would like to just check the different, the pharmacology of the medication. [Inv017]*

*Let's say we are going to Zanzibar on holiday, do we need any vaccines, what is the international health regulations, do we need to take malaria prophylactics. [Inv018]*

*First and foremost, I think the Internet, all this information, is available on the Internet. Every Medical Aid when you phone them, you can get the same information on the Internet. You sit on the phone with them, you've got to wait for 20 minutes, 30 minutes on that phone with them, and you get frustrated and they themselves, the staff, they don't know anything. They don't even know much, because they are not well trained. So, you sit there, you ask, and you then you go from one lady to another lady and you sit, and 30 minutes, and you've got no, you've got nothing there. [JHBFG-01]*

**From Section 6.9.5: Overall process in research**

*Well, I would generally do it from home, because I don't have access to the Internet, although I have access to email at work. Basically, if I was looking for a topic, I would Google my way through it or use something like PubMed to get where I am going, or I'd been given the address via a colleague, or site address. [Inv010]*

*Well, I have a few websites that I have bookmarked, then I would go in and then most of them have searching criteria, and then I would either go into search whether it's family medicine or pediatrics, I would look under the topics they have. And if I don't find what I want, I will the go into, let's say, Google or Yahoo to do a search there, but most of the time I first go to one of my websites that I already have. [Inv011]*

*If it's something that I, well typically you would want to go with where you would hope to find the best information, so the thing that everybody uses is PubMed. PubMed also has a section called MD Consult which is specifically geared towards clinical use, they've got patient handouts and a whole pharmacology section so that's typically where I would start... and if it's something really obscure you start with a good all fashioned Google search. [Inv017]*

*But I mean there are certain things that I, there are certain websites, like I use something called WebMD which is not always that great, but what I like about it, it gives practical information so if you have for example, an anterior dislocation of the shoulder, they will give you the different methods, but they tell you step by step, you put your fingers here, you put your whatever there, and that's good. There is another* *site, I just forget the name, but there are certain sites that I go to first before I just do a random search. [Inv017]*

**From Section 6.10: The Internet as a means of communication with colleagues**

*Doctors refer to another doctor or GP, who replies, send a reply letter to the GP and the surgeon and the surgeon says well I need to operate and he can keep the GP updated in what he wants to do, and the surgeon can write a letter and put in the post and send it to us. [Inv001]*

*More and more GPs should be in touch with the profession, especially guys working by themselves who don't have much problems with Internet access, and they could rely more heavily on computers. [Inv003]*

*It improves communication between doctors in the sense that one can, by email, submit reports to doctors or get reports from the pathology labs. [In006]*

*Ja, I must tell you I have my colleagues overseas, you know, with whom I am talking through Internet using Skype or VoiPBuster, we can discuss certain things sometimes for an hour you know and that's very, very, very practical things…Ja, listen, I have good colleagues outside, overseas, and those colleagues are communicating and using Internet. [Inv016]*

**From Section 6.11.1: Acceptable Topics**

*I think mostly patient information, diagrams, web links [are ok]. [Inv003]*

*Well I think you know it's purely functional and ... or if you got an almost SMS type of thing where you can say to me I received your results and I'll either follow up, or I received your results and that type of thing. [Inv004]*

*But I do mail, for example, I would email referral letters to patients things like that you know in snapshot format [image] so that they can't change it. [Inv005]*

*I would, probably, if we are talking about something like results, let's put it this way, if I were to email them for a notice that I have managed to get you a surgical outpatients appointment on the 17th or whatever it is, that I would find fine. [Inv010]*

*there's place for e-mail, in terms of sending them information that they can read on their own after the initial face to face communication, I think. [JHBFG-05]*

*Ja, well, I think that, particularly with patients that one has a long term relationship with that maybe have on-going medical problems, it's useful because you can do an email any time of day, so you can go home and do it late at night and they can pick up in the morning. [Inv019]*

*Mainly, it's patients who are going far away, or living at a distance, or unable to easily come, but generally speaking I don't particularly like communicating with them on email. [Inv012]*

**From Section 6.11.2: Unacceptable Topics**

*In terms of results and interpreting them, I would feel more comfortable actually discussing them whether they be, certainly not things that are highly stigmatised like HIV and things like that, I would not feel comfortable on. Even if it were something simple like a thyroid test or something, I would probably prefer to have the patient on the other end, rather than a stilted conversation that I would know what their response to it was and we could interpret the results together. [Inv010]*

**From Section 6.12.1: Impact on the length of the consultation**

*It was beneficial, when someone's got those questions you don't have to ask around, his already got them so I don't think it's that much more time consuming. [Inv008]*

*It does lengthen it, it does lengthen it, it could double it, depending, usually only on a first consultation for a certain condition, but it does lengthen it, but it's also interesting. [Inv009]*

*It probably does [affect the length of the consultation] to a small degree, but on the other hand I would have had to hand out that information if the patient hadn't been informed so perhaps. I would say in our setting not that much, because they have actually informed themselves already, the questions are then appropriate and we don't have to start from scratch. So if, maybe a little, but not much. [Inv010]*

*Probably not for me, but I would think I'm an unusual practice in that I spend a long time with my patients, so it's just part of the consultation. But I have long consultations. [Inv012]*

*Well, the length of the consultation comes when they have got this wad of stuff. [Inv014]*

**From Section 6.12.2: Impact on the quality of the consultation – the positive effects**

*I think it's a much more fruitful consultation, definitely to have a more holistic approach to the patients' problems and not just a research tool. [Inv004]*

*it can definitely bring quality into the consultation because it's nice to have patients that are asking questions and that want to know more about their condition and that sort of thing. [Inv005]*

*Well in my experience and with our population it's probably only improved it, I haven't had anything but that. [Inv010].*

*It would add value to the consultation in a sense that you are also made aware of exactly what happens, patients are actually following and keeps up the communication lines open as well. [In015]*

**From Section 6.12.3.1: Quality of the material**

*Ja, often patients get information from the Internet, from not the greatest sites, or you know, not journal articles that more doctors would use as being evidence-based. It's not really evidence-based, it's from more generic websites, consumer patient-oriented websites. [Inv003]*

*I think that somebody once said that the Internet is a mile wide and an inch deep. You do get a lot of non-information, but, if you do know how to go about searching for information, you can get very good quality information, but it's very user-dependent. [Inv004]*

*I think it's more related to the fact that they often pick things up on like non-medical sites and then I find myself having to explain to them why things are being said, and why they are wrong, or why they are partly right, but giving them the real kind of medical evidence. [Inv005]*

*A lot of the time they will come with information that they have received from sites that might not be relevant or might not be accurate, so then I will just correct the information that they have received. [Inv006]*

*Ja, well they aren't obviously always using good quality sites, or they can't distinguish between what is a useful and what is not a useful information because some of it is misleading. [Inv012]*

*But it's a big problem in that they cannot distinguish stuff that is an accepted medical practice and stuff that is a little bit loopy…. Percentage wise, quality stuff, maximum 30%. Bullshit, at least 70%, because they don't know which sites are good sites and which sites have been edited, etc. etc. [Inv014]*

*Very, very varied. Sometimes they come with a whole lot of rubbish, and sometimes they come with fairly reasonable information, and again, I say, more rubbish than reasonable. [Inv019]*

**From Section 6.12.3.2: Misunderstanding the material**

*The one big danger with that, though, is that you may get information off the Internet, but the problem is you need to understand that information in context. [Inv017]*

*Secondly, patients are not taught to interpret what they read on the Internet – just like they don't interpret what we are trying to tell them, they're selective, and this is true of the patients on both sides of the railway line. [CPTFG-01]*

**From Section 6.12.3.3: Self-diagnosis**

*They assume that something is wrong with them, but you don't agree it does make the consultation a bit longer and potentially more difficult. [Inv003]*

*On the other hand there is a big problem the patient who comes in with a pre-set idea of what is wrong with him ... and I find that sometimes it's very difficult to tell them* *otherwise because they have already made up their minds with what is wrong with them. [Inv004]*

*From the disadvantage they can come in and be so focused on the Internet answers, that they don't follow it through with what you are suspecting, or what you are trying to work on diagnosing. [Inv018]*

**From Section 6.12.4.1: Positive attitude**

*I find it quite, I quite enjoy that because its, the patient and you can then have a debate and they have obviously researched it, so it's a lot less explaining and more good questions, so I find that for me, I welcome that type of research. Obviously, there is details and nitpicking which sometimes it's too much detail, but I'd normally give my opinion, although I quite enjoy it when there is that angle, it's quite stimulating for me to answer those enquiries. [Inv008]*

*I'm all for it, you know, I like patients to be as informed as possible, it makes my job easier. You know if you speak to somebody about a certain condition that they might have you don't have to start from scratch you can, they already know something and you can just fill in the details for them, and you can often advise people who have wrong information. [Inv009]*

*I, personally, have never felt threatened by that, and feel quite happy if people have informed themselves and taken an interest in their own pathology. So I'm quite happy to. It's a pleasant change from people who are completely and utterly ignorant about their pathology. [Inv010]*

*The good side is that, when you start talking to them, they actually see that what you are saying is similar to what they have been reading about, and they start identifying with what you are talking about, and they ask more intelligent questions. [Inv018]*

**From Section 6.12.5: The disparity between the variables**

*I'll tell you what that is, it's intimidating. So, I sit here ... and they come, and they've got this tome of information, and they say well doc, what about this pill, and that pill that you gave me, they it was this and that side effect here, and why do I do that. You know what I mean? It often leads to so much tangentalisation. [Inv001]*

*As a doctor, you normally know more than the patient so when the patient comes with a whole of information it kind of makes you a bit more defensive especially if they are starting to doubt the type of treatment you offered. It can cause disruption with that if in just one area the patient almost goes over you, because they say no, but that's actually not the right thing. [Inv003]*

*There are patients who know more about their disease than the doctors, because they are constantly on the Internet getting information about their particular condition, and they browse a lot of websites, and collect a lot of information, sometimes can cause some problem for the doctor who doesn't know so much about their kind of condition, and sometimes doctor can feel embarrassed in front of such patients, that he doesn't know much, and he has to, like, ask the patient to come back next time or after some time so that the doctor can update his knowledge about their condition. [Inv007]*

*It is stressful, you know it's stressful in the sense that you sort of, you're not used to that. You're normally used to people, the traditional, you know the old doctor-focused practices, it used to be the doctor giving information and the patient being ignorant. [Inv008]*

*Some doctors feel it is a throw-back to the day when you know this kind of didactic, paternal type of "I'm the doctor, you're the patient beneath me, and I'm going to tell you what's going on." It doesn't work that way anymore, but some people still do feel "I'm the doctor, and what I say goes." [Inv017]*

**From Section 6.12.6.1: Doctors who look for such sites**

*In cases where patients got chronic diseases and are very inquisitive, I will advise them sometimes of all sorts of site that I find [Iv004]*

*I do have knowledge of those, just simply because of the ones I have looked up myself, or when there is a specific problem, I sometimes go onto the Internet about that, and then say to the patient you know, I think this looks like a useful site, and like a good site, and then, you know, that that would be an interesting one for them to look at. [Inv012]*

*One of the advantages of one of the websites that I use, is that they actually give good quality patient handouts so I, if a patient has a question for whatever reason about something, I just click on the Internet and find a good handout, read it through, and if I agree with it, I hand it to the patient. [Inv017]*

**From Section 6.12.6.2: Limited number of recommendations**

*No, I must be honest, not with my setting [public hospital], no. [Inv010]*

*Generally I tell the, I think the ones, the popular ones are the ones, I probably give the receptionist to look for, but generally the use there again in the practice is not very frequent, it's very, say, maybe, once every three months, or once every six months, not very frequent. [Inv015]*

*I would say 99% of my patients are not using Internet. [Inv016]*

**From Section 6.12.6.5: Payment for the extra work**

*You tell a doctor, you teach a doctor, you tell him, look, you educate a patient… you educate the patients, and, er we pay you for educating a patient and then, you, there's a fee there, a certain fee of R10 or R15 to re-direct the patients to the correct website. You know, then you put there a certain code. [JHBFG-01]*

**From Section 6.12.7: Using the Internet during a consultation**

*If a patient comes to me with a problem, then sometimes I use the Internet I can access the information while the patient is with me and give the patient the information. [Inv001]*

*During my consultation, I probably I would only use it to type up a letter or to access information from the Internet. I don't type my notes on the computer. [Inv005]*

*I use the Internet quite frequently to look up if I have problem in my practice in my day to day running of my practice, when I see patients I would look up like for an answer to a problem that I'm having. [Inv006]*

*I mean I've got a computer in my consulting room, so that I, you know I straight away look things up if I'm unsure about the thing. [Inv012]*

*Especially with patients becoming much more, or some of the patients are extremely demanding, so you like to, some people just want to know a bit more, and some people, other people might not have a very good attitude so you also like to cover yourself to a degree medico-legally. [Inv017]*



**From Section 6.13.1: Billing and claims**

*Communication with your Medical Aids, getting patient data and information – especially after hours, where you can't pick up a phone and call them. As I said, this is a different style of practice [CPTFG-01].*

*It's a medical programme that we have and then we send it through EDI to the different medical aids. [Inv002]*

*Administrative, is we are sending all our accounts by email, actually through Internet… This computer is only for our administration, sending accounts and receiving accounts. But electronically, for our administration cannot exist anymore without Internet, because all data are going through Internet. [Inv016]*

*Now, we have a very good table which we set up like we, because we get direct deposits on most of our accounts so now, if you get a direct deposit and we see that money has come into our account. [JHBFG-01]*

*We have 23 doctors working taking turns at night to man a clinic from 7 to 11 and er, the one doctor says he's got a lot of insight into um Medical Aid, um, the way they think and he says, um, often these Medical Aids, they're not au fait yet with their own system, so they'll recognise acute bronchitis for all the patients for one day – you don't have to differ, you can load your flavour of the day, and you can sit and make all the accounts on that one diagnosis and he says he's waiting for a Medical Aid to call him because all his patients who were injured are injured in a tornado! So, the mechanism of injuries involved in the tornado and so far he hasn't had any comeback! [JHBFG-02]*

**From Section 6.13.2: Other uses**

*Most Practice's software, you have to go through and say, O.K., I've got so many patients, and then say, how many patients are suffering from this, you've got to look again, so it's laborious, it's not very user-friendly. [JHBFG-05]*

*…we get all our blood results encrypted and emailed to us. [Inv001].*

*Well I have access of my blood results by Internet ... if there is anything that I, ja, we just print it out or they just basically load it I can get it. [Inv002]*

*Yeah, I use it to look at if the guys are crooking or not! If the medical accounts are paid or not paid. As soon as a patient walks in I mean, I've got to see I mean, ja, this might be a write-off here, or his Medical Aid is suspended, I use it all the time, every patient I look up on the computer. [JHBFG-01]*

**From Section 6.15: Usage in comparison with the rest of the world**

*As doctors, we are educated as any doctor involved in any first world country, if not better, therefore, you know, you've got the same mental capacity, the same interests for which you need doctors in the world. [Inv004]*

*I think South African doctors are quite well trained and probably their level of knowledge and technology is probably about on par with that of people in other countries, developed countries. [Inv006]*

*I think that doctors belong to a more educated category of citizen in South Africa, and also they are relatively financially well-off, and more privileged also. [Inv007]*

*I just don't think we are put off by, be it a sluggish connection or whatever. We're still as keen to communicate, keen to gather information and to refine our practices. [In010]*

*I think, you know, in South Africa, we are aware of the fact that we are lacking in many degrees in our medical expertise and the technologies we have, but I don't think we like that, so we like to keep up to breast with what is going on in the medical world especially overseas. [Inv011]*

*I mean it's only really hard if you are working in a very rural area and so it's, you know, we can still, we still want the same information and still do have access to it even if it's slow and not as quick, sometimes not as easily available. [Inv012]*

*I suppose medical practice has to be as sophisticated as anywhere else in the world, to some extent. [Inv013]*

*I can believe that it's no different in this country than it is elsewhere. And medicine in this country as yet is still first world so I think it reflects what is happening in the first world. [Inv014]*

*I think most GPs keep abreast of information, and basically there in practice, probably wants to apply the most recent advances in medicine instead of being caught up with old antiquated treatments…I suppose, being in the medical field you are going to be, there are going to be common sort of areas of pursuit, as it were, and GPs in the rest of the world is going to be on the same track as we are at the moment, to keep abreast of matters, as it were. [Inv015]*

**From Section 7.2.1: Expertise**

*PubMed, that's, but it does cost to subscribe to that, so I think some doctors, and also it's quite intimidating piece of software to use, have you ever tried it? [Inv001]*

*I'm technophobic, so until now, I've never had a computer, I don't own a PC, it was the first time I've really used a computer in the last year, and I use it little compared to my colleagues there. [Inv008]*

*I'm not really computer literate, you know I'm one of the older generation and, you know I just don't do, really do that sort of thing, it's quicker to pick up a telephone. [Inv009]*

*The few occasions that I have had a go at the Internet, I found it difficult to find what I wanted… I think if you are more experienced and you know what system to use, it will be quicker, but I know, one time, I wanted to read up something about something and there were 55,000 references and I didn't know where to start. [Inv009]*

*And um, yes, to know the proper way to go about really gaining the knowledge, because my sister lives in Stellenbosch, she wanted to become a tour guide and do her own tours, but she went, I think to one of these colleges, like [college name] and they taught her how to use e-mail and also Internet access. Now, maybe that's something that I should consider just as a basic step and then the fine-tuning will happen by itself, once you go onto sites like S A Medical Org, the ones that you will probably use frequently. [JHBFG-02]*

**From Section 7.2.2: Time and workload**

*I would never ever be able to have any time, and I have little enough as it is. [Inv014]*

*As a general practitioner, you are under the whip, you know, you are constantly working, you have very little free time, your free time is accessed more and more by medical aids and insurance companies, etc. because this kind of documentation, you can't do during the day if you're busy because it takes 20 minutes. [Inv014]*

**From Section 7.2.3: Difficulty of access**

*Because you don't have Internet there [in peri-urban areas]. [Inv012]*

*I think the issue here is that the practice computer is based in the admin section, and I am a distance away from it, I don't really have a desk top as it were, so it becomes a little bit of an effort to get down to the work station at the admin and search out the actual information I am looking for. [Inv015]*

*Yeah, that's it, they won't, they don't provide a computer. There's a computer in reception and there's a computer in the pharmacy, and there's a computer in the mis-manager's office and she doesn't know how to use it! [CPTFG-01]*

*We must remember that this is a third world country, and we've already discovered Eskom [Electricity Supply Commission] cannot deliver the goods. [CPTFG-01]*

**From Section 7.2.5: Lack of interest**

*I'm certainly not going to change my habits as far as the Internet is concerned. Honestly, I actually just see it as an extra burden, and I think a lot of the people, a lot of the doctors will [Inv014]*

*I hate the computer, and I hate opening it all up [Inv014]*

**From Section 7.3.1: The users' perspective**

*It just means that they are limited in terms of where they can get information from, and also they would have to organise their practice in a way that doesn't need Internet, and I'm pretty sure that there are plenty of people who still do that that rely heavily on basic computers without using the Internet and paper records. So it just means that they don't have as easy access to the stuff that you can get on the Internet. [Inv019]*

**From Section 7.3.2: The non-users' perspective**

*Right, the practice runs on a computer, OK, but it's really got no telephonic link to any email address. We have got a [Bank name] Bank credit card machine that runs through the telephone. It's a cash practice in effect, OK, most patients if not all of them pay after the consultation. [Inv014]*

*Either medical journals that I have, BMJ, whatever. [Inv014]*

**From Section 7.4.1: Too few patients with email**

*I wouldn't say so.  We are basically in a district hospital setting, so you know, you don't really have much choice what you do… I know some of other doctors who work in the private doctors in Bloemfontein, they also use the Internet to communicate with patients, and they print out printouts from the Internet that they also sometimes give to patients, but our patients are not very well educated to begin with, so in our setting that's a bit difficult to do. [Inv011]*

*I spent the bulk of my time in, at State hospitals in my short career so like I say we just don't have access to it. [Inv017]*



**From Section 7.4.2: Impact on personal life**

*I think the problem is that it if comes after hours and it's very, very intrusive on your family life. [Inv004]*

*Well, as I'm a one man practice occasionally …I actually am on call for my patients and I leave my cell phone number.  Now, you cannot believe when and where and how I get messages, while I'm on holiday, my testicle's swollen, what should I do, you know my tooth is sore and can't see the dentist and SMS messages. Now if you, if it's bad enough on the cell phone, and they do this on a Sunday night, or on a Saturday, or while I'm on holiday can you image what patients would do if they knew that I was on the email? [Inv014]*

*I must say I don't like it as, it's not suiting me because I see it as an add*-on to my *existing, its more problems that I have to do once my clinical ends so I see it, I don't see it at the moment as an advantage because it's an extra hassle. [Inv008]*

*I haven't got any personal experience with that, but I think that, that can be extremely useful, but it is also open to abuse, and I think what all doctors are absolutely terrified of is the patient who gets their email address and they're not kind of, you get patients that will, you know, phone us for every ache and pain, and it will just be exactly the same with email, except that you can't screen your email. [Inv019]*

**From Section 7.4.3: Impact of online communication**

*I prefer not to communicate with my patients via email, simply because I prefer to be talking to them or to be consulting one on one with them. [Inv012]*

*It's better to tell them to come into the Rooms because then it's a dialogue. With e-mail, it's one set of information going one way and then, without getting a chance to, maybe ask for more detail, or modify what is being said, could you re-phrase that question. You lose that ability so it's better for four eyes equal talking to each other. [JHBFG-02]*

*There would be a difference [between email and telephone] because the email you are not going to sit and, you could convey more information with a telephone conversation, you are not going to type out a 10 page email but you can easily flub 10 pages if you have a good conversation on the telephone, so I would say you get more across with a telephone conversation. [Inv017]*

*From the perspective of a patient communicating with a doctor [via email] I don't think it's right, I think from a position of a doctor communicating with a patient a telephone call is much more personal, and you are more likely to get things done more completely and quicker.  So I would never be in favour of using Internet and emails to patients in a big way. [Inv018]*

**From Section 7.4.4: Confidentiality and security**

*Personally, I don't do it, and I have never done it, but I would assume that there be would issues about confidentiality and issues, some things you cannot discuss by email. [Inv003]*

*Ja, I think so, it should be a controlled, in a controlled kind of environment, where maybe I have access via a password, or something, and only I would be able to access those emails, just to protect confidentiality, and then maybe if patients want to send emails, they should do it in a certain way, and not expect that that should replace a consultation. [Inv006]*



**From Section 7.6: Non-use of the Internet for practice management**

*We are basically in a district hospital setting, so you know, you don't really have much choice what you do. [Inv011]*

*I don't [use it for practice management] because I've got a cash practice, so my patients pay cash and they then claim back themselves. [Inv012]*

*When I was solo, which was in 2005 and before, certainly, we did communicate via the Internet, but now that I am in [Group Name], and they have to worry about all that I am not using any hubs or anything like that. [Inv018]*

**From Section 7.7: Google Scholar**

*Personally I have never heard of it. [Inv003]*

*What is Google Scholar? [Inv005]*

*I actually don't know about Google Scholar, I only know about Google, I've never heard about Google Scholar. I think maybe you must advertise a little bit more. [Inv011]*

**From Section 7.8.1: Percentage of doctors responding online**

*I suppose still I actually prefer to do something on a piece of paper than on a screen, so, similarly, if I am getting information, I actually prefer to print out information than to just be reading it on the screen, or if it's something I want to keep, I don't actually go and put it on a site that I want to keep, I actually rather have the information printed out and kept somewhere to find it easier. [Inv012]*

*I find it easier to put a tick on paper than to go scrolling through screens. It's easier to read paper than reading a screen, and easier to turn a page than to click a mouse. Paper is great. [Inv013]*

**From Section 7.8.2: The overall low response rate**

*Is that low in terms of general surveys? 10%, is that low? [Inv010]*

*A colleague of mine wanted to do a Masters thesis, and he had to send papers all over the country and I don't think he got 10%. [Inv018]*

*Well, you think it's low. I think that's good…I would suggest that you mustn't be disheartened with 10%. I think 10% is very good. [CPTFG-02]*

*Doctors often feel, I think, that they don't have time for this, I don't have time for this. [Inv001]*

*I think that doctors that are busy possibly take it, plan to do it and then put it away in a drawer somewhere then forget about it. [Inv005]*

*The reason is that doctors are quite busy people [Inv007]*

*People phone you from the bank, then they phone you from the insurance company and you get so fed up with it. [Inv017]*

**From Section 7.9.1: Information**

*There is quite a lot of information that is just sitting and we are not able to use it. Research, operational research that we can drive from these data bases and information that's lying around in his Practice and my Practice and his Practice, in* *hospitals that we see around, to understand more what is going on in terms of the trends, of diseases. [JHBFG-05]*

*I also hope that at some point there would be some kind of national database where one could look up things for a patient, let's say I prescribe something for a patient that then he goes to the pharmacy the pharmacy could actually see what has been dispensed elsewhere in the country for that person because I think that kind of system although it's got a lot of shortfalls and complications could be quite useful. [Inv005]*

**From Section 7.9.5: Practice management and administration**

*I would love to have everything computer based, but even computer based, our records aren't computer-based, I like our practice to have it. [Inv001]*

*For our government policies to be more readily available on the Internet. Especially, you know, for our district hospitals where we really have to follow the protocols that the government, you know, wants set out there, most of the times they are not available or you have really you have to struggle to get hold of them I think that might be one of the things, you know, in our setting especially that I would like to see improved. [Inv011]*

*a data base of patients, er, that have got a national footprint, say for instance if you are here in Jo'burg you can be identified by a number and it could be an I.D. number or some other number. When you use that same number down in Cape Town or in Durban, all your medical history comes through. Sort of a national database. [JHBFG-05]*

*Automatic, automatic reporting. I'd like to see a system whereby, at a click of a button, you understand how many patients you're seeing. It's automatic. [JHBFG-05]*

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