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Better Health from Better Data and Better Information

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Declaration

Except where otherwise acknowledged in the text, this thesis represents my own original work.

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7 February 2008
This thesis was edited for language by Dr Peter Arnold, a member of the Society of Editors (NSW), a retired medical practitioner with no experience in the use of IT in a general practice.
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I thank my partner, Alistair Harvey. I know this could not have been done without you!

Finally, to my lil children: O’shan, Jahla and Sen – for your incredible patience with Mum. I hope our journey leads us to new and exciting beginnings.
Abstract

Chronic diseases are a major challenge, both globally and in Australia, to individuals, to their attending clinicians, to the provision of health care services and to the financing of health care. Their impact on the health of individuals has resulted in increased calls for more effective systems of care and improved methods of assessing the performance of health systems.

The primary health care (PHC) sector is seen as being best placed both to moderate the increasing incidence of chronic diseases and to limit their progress through more effective care. A key component of effective primary health care of patients with chronic diseases is the management of data and of information and the appropriate use of information technology (IT). The challenge for the sector is its capacity and capability to strategically utilise these information resources to effectively care for patients with chronic diseases.

Type-2 diabetes is now recognised to be as a world-wide epidemic. My project, the Information Atlas Project, was a descriptive study investigating how data and information are managed by PHC services to support the care of patients with chronic diseases, with a particular emphasis on the care of patients with diabetes. I undertook four case studies of three different PHC settings: an Aboriginal community-controlled health service; a community health service; and two private general practices, one rural and one urban. Site selection was influenced by the size of the workforce, specialisation in the management of patients with diabetes and the use of an electronic patient information recall system. The methods included document review, process mapping, clinical chart audits and formal and informal interviews and discussions.

The project demonstrated that the chronic disease model of care, as described by Wagner in 2001, was emerging within the study sites. This was demonstrated in all four case studies by the presence of a multidisciplinary team; the use of clinical guidelines and the presence of processes of follow-up and review. The monitoring of clinical activity was also emerging, with the government-funded services (Aboriginal Community Controlled Health Service and Community Health Service) becoming increasingly involved in regular performance monitoring activities as part of the funding arrangements. IT systems were present in each of the sites, but the use of these systems to support the care of patients with diabetes was limited by the level of service investment in IT resources and training. The project also identified, across all four sites,
incomplete collection of data and information; differences amongst the staff in their competence in managing data and information; limited use of data and information standards and of guidelines; and variable experience in clinical quality improvement and of external monitoring. The demonstrated limitations in data and information management and in the use of IT in supporting the care of patients with diabetes were related to several service factors: past experiences and funding arrangements; organizational structure and decision making processes; IT systems; and capacity and capability of workforce.

When compared to approaches used by other health systems, these findings highlight the need for PHC services to build on the lessons learnt and to develop innovative approaches to strategically managing data and information resources. Key areas to be addressed include a PHC information policy and strategy; a coordinated and strategic approach to PHC representation; workforce capacity and capability and cultural change.
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<td>Audit and Best Practice for Chronic Disease</td>
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<td>ACC</td>
<td>Annual Cycle of Care (Diabetes)</td>
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<td>ACCHS</td>
<td>Aboriginal Community Controlled Health Service</td>
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<tr>
<td>AGPAL</td>
<td>Australian General Practices Accreditation Limited</td>
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<td>AGPN</td>
<td>Australian General Practice Network</td>
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<tr>
<td>ANU</td>
<td>Australian National University</td>
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<td>AHIC</td>
<td>Australian Health Information Council</td>
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<tr>
<td>AHW</td>
<td>Aboriginal Health Worker</td>
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<tr>
<td>BHOP</td>
<td>Better Health Outcomes Project (Queensland Health)</td>
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<tr>
<td>BMI</td>
<td>Body Mass Index</td>
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<tr>
<td>BSL</td>
<td>Blood Sugar Level</td>
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<tr>
<td>CEO</td>
<td>Chief Executive Officer</td>
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<td>CHS</td>
<td>Community Health Service</td>
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<td>CIP</td>
<td>Continuous Improvement Project</td>
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<td>CQI</td>
<td>Continuous Quality Improvement</td>
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<td>DON</td>
<td>Director of Nursing</td>
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<tr>
<td>e-Health</td>
<td>Electronic Health</td>
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<td>EMPHC</td>
<td>Enhanced Model of Primary Health Care</td>
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<td>EPC</td>
<td>Enhanced Primary Care</td>
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<tr>
<td>FPA-PHC</td>
<td>Framework for Performance Assessment in Primary Health Care</td>
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<tr>
<td>GP</td>
<td>General Practitioner</td>
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<td>GPMP</td>
<td>General Practitioner Management Plans</td>
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<tr>
<td>HbA1c</td>
<td>Glycosylated Haemoglobin</td>
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<td>Acronym</td>
<td>Description</td>
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<tr>
<td>HfL</td>
<td>Healthy for Life</td>
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<tr>
<td>HIC</td>
<td>Health Insurance Commission</td>
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<td>IAP</td>
<td>Information Atlas Project</td>
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<td>ICT</td>
<td>Information Communications Technology</td>
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<tr>
<td>ID</td>
<td>Information Directorate (Queensland Health department)</td>
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<td>IM</td>
<td>Information Management</td>
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<td>IM&amp;ICT</td>
<td>Information Management and Information Communications Technology</td>
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<td>IT</td>
<td>Information Technology</td>
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<tr>
<td>LGA</td>
<td>Local Government Area</td>
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<td>MAE</td>
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<td>MAHS</td>
<td>More Allied Health Services</td>
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<td>MD</td>
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<td>NACCHO</td>
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<td>NDSS</td>
<td>National Diabetes Services Scheme</td>
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<td>NHDD</td>
<td>National Health Data Dictionary</td>
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<td>NHIG</td>
<td>National Health Information Group</td>
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<td>NHMRC</td>
<td>National Health and Medical Research Council</td>
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<td>NHPC</td>
<td>National Health Performance Committee</td>
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<td>NIDDM</td>
<td>Non-insulin dependent diabetes</td>
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<td>NPP</td>
<td>National Privacy Principles</td>
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<td>NQPS</td>
<td>National Quality Performance System</td>
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<tr>
<td>OATSIH</td>
<td>Office of Aboriginal and Torres Strait Islander Health</td>
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<td>PhD</td>
<td>Doctor of Philosophy</td>
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<td>PHC</td>
<td>Primary Health Care</td>
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<td>QAS</td>
<td>Queensland Ambulance Service</td>
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<td>Acronym</td>
<td>Description</td>
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<tr>
<td>RACGP</td>
<td>Royal Australian College of General Practice</td>
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<tr>
<td>RN</td>
<td>Registered Nurse</td>
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<td>RRMA</td>
<td>Rural, Remote and Metropolitan Areas</td>
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<td>SAR</td>
<td>Service Activity Report</td>
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<td>SCARF</td>
<td>Support, Collection, Analysis and Reporting Function</td>
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<td>SDRF</td>
<td>Service Development and Reporting Framework</td>
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<td>SIP</td>
<td>Service Incentive Payments</td>
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<td>SPSS</td>
<td>Statistical Packages for Social Sciences</td>
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<tr>
<td>SQL</td>
<td>Structured Query Language</td>
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<tr>
<td>UQ</td>
<td>University of Queensland</td>
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<tr>
<td>WELL</td>
<td>Workplace Employment Language and Literacy Training in Business Communication</td>
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Chapter 1: Introduction

Here I briefly describe the personal experiences in PHC which initiated my decision to investigate the management of data and information by primary health care services.

Then follows an outline of the remaining chapters in this thesis: background, methods, four case study chapters, and conclusion.

Personal Experience

I first became interested in the management by PHC services of their data and information collections in their provision of clinical care while working for five years as a physiotherapist. I then enrolled in the Masters of Applied Epidemiology (MAE) course in Indigenous Health, at the Australian National University (ANU).

Once I had completed the Masters course, I became more involved in research and increasingly interested in data and information management within primary health care services. After three years of research experience, I decided to explore these topics in more detail by undertaking research leading to the submission of a thesis for a doctorate of philosophy.

Clinical Experience

After graduating from the University of Queensland in 1994, I commenced work in a small rural town in north Queensland. The physiotherapy department was part of the local hospital, which was managed and funded by the state Department of Health.

At the time, the hospital, in pursuing accreditation, was implementing new policies and procedures to meet the accreditation standards. These included recording the time spent with patients as well as the time taken for tea breaks; recording staff attendance at training and development activities (such as cardiopulmonary resuscitation and occupational health and safety courses) and ensuring that staff were fully informed and aware of emergency procedures and the relevant telephone numbers.

As a junior physiotherapist, I had little understanding of the senior physiotherapist’s management neither of our statistics nor of the hospital’s senior management team’s use of those data.

After 12 months, I moved to a remote community in far north Queensland where I was the sole physiotherapist, based at the local hospital. I cared for inpatients and outpatients...
and provided an outreach service to nearby communities. I also attended to the administrative duties of the physiotherapy service, which involved maintaining a record of activity.

These statistics were reported, on a monthly basis, to the district’s senior management team. As previously, receiving limited feedback, I was unsure where this information went and how it was used to support the service.

I became aware of the importance of data and information management when I was developing a proposal to seek additional resources for the local physiotherapy service and to support community programs.

For example, type-2 diabetes was common, with many patients needing a lower limb amputation or renal dialysis. Being involved in the rehabilitation of patients with lower limb amputations and children with physical disabilities, I was responsible for ordering their equipment through Queensland’s Home Medical Aids Scheme and I visited their homes to assess and make recommendations on modifications to improve their access and assist in their activities of daily living. Most required housing modification. However, there was usually a delay on the part of the appropriate organisation in addressing my recommendations and as such, some of my patients died before modifications were started.

Finding this process frustrating, I questioned whether or not these problems could be avoided with better use of data and information. Although I had the appropriate data to support my proposal, I lacked the necessary knowledge and skills to transform those data into meaningful information. In my search for assistance, I discovered a lack of data and information management skills amongst other staff and an absence of mechanisms to support the use of information constructively. Most of the staff capable of providing assistance had a personal interest in data and information management; their expertise went with them when they left the health service. Although I thought initially that these problems were due to the remoteness of the region and the skills and experience of the personnel recruited, I soon discovered that these problems existed in other settings.
Research Experience

After completing my Master’s course, I assisted a community-controlled health service to initiate and develop research projects and also performed additional work relevant to my epidemiology experience. This involved analysing the service’s data and information collections from the electronic patient information system.

Although the electronic patient information system, Communicare, was equipped with a reporting function, I discovered that the system had difficulty in supporting complex requests, such as identifying the number of abnormal pap smear results in women from Community X within the last 6 months. In order to obtain a better understanding of the system, I participated in Communicare’s staff training. I was advised by the software provider that complex queries could be addressed, but that this required the development of additional database instructions, which had to be purchased by the service.

Following the Communicare course, I worked with the service’s information technology officer to electronically export a specific set of variables from the Communicare system into an Excel database, and from that into an analytical program, Statistical Package for Social Sciences (SPSS). This process was difficult because the information had to be retrieved by writing a special program using structured query language (SQL) which could only be run after-hours to prevent the system crashing.

Once the data were imported into SPSS, I spent many hours ‘cleaning’ the database. Data had been entered into the electronic patient information system by different people, ranging from receptionists to clinicians. People had recorded data in different locations within the medical file and had often used different terms to describe the same clinical condition or laboratory test.

This experience clearly revealed that, in order for the PHC service to monitor the performance of clinical care processes and to report on outcomes in a timely manner, the quality of the data and information collections had to be improved. However, this required commitment and support from the senior management team as well as an increase in service capacity to ensure its sustainability.

In 2004, I therefore decided to undertake further postgraduate study to better understand the challenges faced by PHC services in using data and information to support the care
of patients with chronic diseases and to identify what was needed to improve data and information management in order to improve the quality of care.

**Thesis Chapter Outline**

In this introductory chapter, I have briefly described the experiences underpinning my decision to undertake this research.

In chapter 2, I present the background to my project, in three sections. The first describes my literature search. The second, my findings from the literature review, is itself in two parts: part A is a broad overview of the topics related to this study, while part B focuses on topics specific to this study. The third section describes my research questions.

In chapter 3, I describe the study design and discuss the theoretical background of the methods used. I then discuss the methods in this study, which include:

- Information audit;
- Project advisory group;
- Selection of cases;
- Consultation process;
- Document review;
- Chart audit;
- Process map;
- Interviews;
- Analysis and feedback of findings.

I then describe the processes involved in obtaining ethics approval.

In chapters 4 to 7, the case study chapters, I present the findings from the four PHC services: an Aboriginal Community-Controlled Health Service (ACCHS), a Community Health Service (CHS), and two private general practices, one rural and one urban. The case study chapters are each divided into four parts. Part A provides contextual information about the PHC service. Part B describes the process of care of patients with diabetes. Part C describes the processes and flows of information in the care of patients with diabetes. The fourth part, the discussion, summarises the main findings from that
case study and describes the service factors which have affected the management of data and information to support the care of patients with diabetes.

In Chapter 8, the main findings from each of the case study chapters are drawn together. While acknowledging the strengths and limitations of this study, I discuss the implications of these findings for PHC policy and practice.
Chapter 2: Background

The background to my project is presented in three sections. The first section describes my approach to my literature search. The second, which presents the findings from my review of the literature, is divided into two parts. Part A is an overview of the broad topics related to this study while Part B focuses on more specific topics. In the third section, I present my specific research questions.

Literature Search

In developing this study proposal I searched the literature in several areas. My search terms included: ‘information management’, ‘primary health care’, ‘health system performance’, ‘quality improvement’, and ‘clinical management’. The terms were used individually and in combination.

I searched the library catalogues and databases at the ANU, the University of Queensland, and the Queensland University of Technology; PubMed; and Google Scholar. I also identified literature from reference lists and bibliographies and from the review of documents undertaken in each of the PHC services which I studied.


I included books, journal articles, reports and documents in my literature review.
Literature Review

*Part A – Broad Topics*

Part A is divided into five subject areas.

I first describe the rise in the prevalence of chronic diseases and then the chronic disease model of care. Then follows a brief discussion of the role of PHC services in caring for patients with chronic diseases.

I then describe the role of IT within the health care system, the ICT market share in health and in PHC and finally, the monitoring of health system performance.

**The rise in prevalence of chronic diseases**

Chronic diseases are a major health challenge both globally and in Australia. In developed countries they affect approximately 80 percent of adults aged 15 years and over. In middle income countries, the prevalence exceeds 70 percent [1, 2]. In Australia, chronic diseases are responsible for around 80 percent of the total burden of disease, mental problems and injury [3]. They are a major component of rising health care costs and are likely to consume 75 percent of health dollars in the near future [4].

Chronic diseases are long-term\(^1\) non-communicable diseases, which involve some functional impairment or disability [3, 5]. The diseases tend to be complex conditions in how they are caused, often long lasting, persistent in their effects, and can produce a range of complications [6]. They have significant long-term effects on the lives of affected individuals and of their families.

**Components of the chronic disease model of care**

The care of patients with chronic diseases involves a different approach from the treatment of acute illnesses. The treatment of acute illnesses and injuries usually takes days or weeks,

\(^1\)Long term is defined as lasting more than 6 months.
requires little active involvement on the part of the patient and a limited need to monitor disease progression. The care of a patient with a chronic disease, on the other hand, requires the patient’s active involvement, a specialised multidisciplinary team-based approach, and a systematic plan for long-term care.

Wagner et al suggest that the design of health care systems is effective in managing acute illnesses and injuries, but that they are poorly organised and unprepared to face the challenge of effectively addressing the rapidly ageing population with its growing prevalence of chronic diseases [7].

A model of care which has gained widespread international credibility is the ‘chronic care model’, used in over 500 health care organisations in the United States. This has been shown to positively affect patient outcomes [7, 8]. The model addresses six key elements:

- linkages to community resources,
- support for self-care,
- decision support,
- design of health care delivery systems,
- clinical information systems, and
- organisation of the health care system.

The chronic disease model of care is reflected in contemporary approaches to the care of people with diabetes.

The role of primary health care services in the management of chronic diseases

The demand for PHC services in Australia was highlighted by the National Health Survey which found that, in the two weeks leading up to the survey, nearly one quarter (23%) of Australians living in private dwellings consulted a general practitioner (GP) [9].

PHC services are best placed to implement the chronic disease model because they are one of the first points of call for most people entering the health care system. PHC services also
provide an opportunity to implement preventative and caring strategies, which might reduce
the progression of the disease into needing secondary or tertiary care [8].

According to the Declaration of Alma Ata, the basic foundations of primary health care are
to:

- reflect the economic, social and political characteristics of the country and its
  communities,
- be universally accessible to individuals and families in their communities,
- give priority to those most in need,
- involve collaboration with other related sectors such as education and housing,
- maximise community and individual self-reliance and participation, and
- be based on scientifically sound and socially acceptable methods and technology
  [10].

PHC services include health promotion, disease prevention, treatment of acute illnesses and
injuries, care for patients with chronic diseases, advocacy and community development

At the service delivery level in Australia, the PHC philosophy has evolved in three broad
streams. The first includes the strong, usually small, private business-based stream,
orientated around episodes of treatment of the acute illnesses and injuries of individuals and
families. This includes GPs, community pharmacists and allied health workers such as
nurses, physiotherapists, psychologists, dieticians, optometrists and dentists. The second
stream, the state- or territory-funded community health service stream, includes the
ACCHS. The third - the population health stream - includes health promotion and disease
prevention programs and activities [12]. Although the ACCHS is included in the
community health service stream it is in fact funded by the Commonwealth government.
The models of PHC service that have arisen from these streams do not include all aspects of comprehensive primary health care and there are significant differences between models. According to Wakerman et al, the models can be divided into five broad categories:

- Discrete services, such as general practitioner models;
- Integrated services, such as the multi-purpose services (MPS) program;
- Comprehensive Primary Health Care Services, such as some ACCHS;
- Outreach Services; and
- Virtual Outreach services, such as telehealth [13].

The role of information technology in the health system

IT encompasses all forms of technology used to create, store, exchange and use information [17]. The term has been broadened to reflect the different areas within the field and is now used to cover many aspects of computing and technology such as information management (IM) technology and Information Communication Technology (ICT).

There is general agreement in the Australian health sector, that information is an important resource to achieving health care reform and improving health outcomes [14]. The electronic Health (e-Health) agenda aims to interconnect the health system through national co-ordination of systems and information interoperability to enable better integration of services across the care continuum to achieve improved quality of care for

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2 "e-Health is an emerging field in the intersection of medical informatics, public health and business, referring to health services and information delivered or enhanced through the Internet and related technologies. In a broader sense, the term characterizes not only a technical development, but also a state-of-mind, a way of thinking, an attitude, and a commitment for networked, global thinking, to improve health care locally, regionally, and worldwide by using information and communication technology.” 15. Eysenbach, G., What is e-health? J Med Internet Res, 2001. 3(2): p. e20.
individuals and communities – and assist in containing cost increases driven by advances in medical technologies and an ageing population [13].

The challenges in achieving this vision include the presence of several IM&ICT initiatives that are varied and largely independent with some activities aimed at building innovative systems that were often incompatible or unconnected and the split in funding and delivery systems between the Commonwealth and the State and Territory governments and between the public and private sectors [14].

These initiatives include [14]:

- The National Health Information Agreement in 1993, which laid the foundation for the collection of consistent health data sets and the Australian Health Ministers Advisory Council, endorsed National Health Data Dictionary (NHDD). As a result, there is now consistent, timely and reliable information on a range of health issues and health services available for analysis, research and comparison at all levels of the health care system.;

- The establishment in 1993 of the National Health Information Management Group (NHMIG) that supervised the development of national statistical data standards and the creation of the NHDD;

- To guide the development of health information the National Health Information Development Plan was established in 1995. Its objectives were to:
  - Promote the development of high priority health information
  - Increase the cost-effectiveness of Australia’s health information system, and
  - Contribute to increases in the cost-effectiveness and equity of Australian health services and thereby the wellbeing of Australians.

- In 1998, the National Health Information Management Advisory Council (NHIMAC) was established to supervise national projects and standards development in ICT;
• In 1999, NHIMAC released Health OnLine: A Health Information Action Plan for Australia, a national strategic information action plan, followed by the establishment of the electronic health record project HealthConnect;

• Priorities for national health information were developed in September 2002, which provided a guide for managing the development of national health information management for the period 2001 to 2005 and focused on:
  - Aboriginal and Torres Strait Islander Health
  - Integration of services – coordinated care
  - Safety and quality in health care
  - Information technology and health
  - Population health
  - Equity and access
  - Health labour force
  - Performance of the health system
  - Standards and classification
  - Management of health information.

A recent initiative has been the development of a national e-Health strategy, that is intended to provide a vision for e-Health over both public and private sectors for the next five to 10 years and to provide advice on what forms of governance will need to be put into place to manage it.

The current national health IM&ICT governance structures are depicted in Figure 1.
The National Health Information Group\(^3\) (NHIG - representing the jurisdictions) and the Australian Health Information Council (AHIC - an expert advisory group) were established in 2003. The committees aim to increase the effectiveness of information technology investment in the health sector to ensure that it provides a catalyst for health care reform and improved quality of care. [16]

\(^3\) NHIG has become the National Health Information Management Principal Committee (NHIMPC).
Other organizations and national health sector bodies involved in the development of information management and technology systems are:

- NeHTA⁴
- AIHW⁵
- Australian Commission on Safety and Quality in Health Care⁶
- Standards Australia⁷
- National Health and Medical Research Council (NHMRC)⁸, and
- Commonwealth, State and Territory governments⁹.

Whilst IM&ICT policies are emerging within the different models of PHC¹⁰, there appears to be no overarching national IM&ICT policy for PHC services.

The total Australian health system expenditure on IT is approximately $55.3 billion (3.2%), which, by comparison with other nations, appears to be an under-investment [14, 18]. However, as set out in the national Information Management and Information

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⁴ NeHTA's role involves setting standards and specifications for electronic health information systems that will be adopted by jurisdictions.
⁵ AIHW's role involves providing information on Australia's health and welfare through statistics and data development.
⁶ Australian Commission on Safety and Quality in Health Care role involves leading and coordinating improvements in safety and quality in health care.
⁷ Standards Australia provides links to the ICT industry and the private health care sector in developing technical standards.
⁸ NHMRC promotes the development and maintenance of public and individual standards.
⁹ Commonwealth, State and Territory governments responsible for collaborating together, and with stakeholders, on national IM&ICT programs and initiatives to meet service delivery and infrastructure needs, and participating in the national reform agenda through their support for COAG initiatives, as signatories to the NHIA and through their involvement on the Board of NeHTA.
¹⁰ Australian General Practice Network (AGPN) - Information Policy; Australian Medical Association (AMA) - Strategic Framework for Improved Information Management through the use of Information Technology in General Practice (1997) Position Paper, and Queensland Health - Information Management Strategic Plan 2005 to 2010.
Communications Technology (IM&ICT) strategy, Australia appears committed to investing in IM&ICT,

IM&ICT will change and improve health service provision for the benefit of both consumers and providers by improving the quality of care; providing more accurate and complete medical documentation; and improving communication among health care providers, helping them to respond more quickly to patient needs. [19]

According to the National Health Information Group (NHIG) and the Australian Health Information Council (AHIC), IT systems, particularly the ICTs, play an important role in the health care system [14]. ICTs are perceived as vehicles for interconnecting governments and the private and public health care sectors, in order to enable the national co-ordination of services and information sharing - key elements in achieving health care reform with associated improvement in health-care outcomes.

The key application domains for ICT in health care delivery include clinical care (such as tele-medicine, tele-health and home tele-care), clinical decision support, performance monitoring, business management and information exchange [11, 20, 21].

In clinical care, ICTs facilitate:

- one-way and interactive disease-specific web sites on the Internet,
- home-based biometric measurement devices, which collect and communicate objective clinical information, and
- context-sensitive alerts, guidelines, and reminders delivered to the point of care via electronic linkages, which connect health-care plans, consumers and their care givers.

According to Nobel et al, the use of ICT to support the care of patients with chronic diseases has been shown to have positive outcomes, such as better health, fewer complications and co-morbidities, and lower health care costs [22].
ICTs also facilitate the use of data and information to monitor service activity and the use of resources, provide business support tools such as email, word processing, and accounting packages, and allow services to exchange information to coordinate patient care [21].

The ICT market share in health and in primary health care

The Australian Trade Commission states that the ICT industry in Australia has an annual turnover of around $65 billion [23]. Australia is the 11th largest ICT market in the world and the fifth largest ICT market in the Asia-Pacific region. Whilst e-health is listed as one of the key areas of expertise, anecdotal evidence suggest that providers of software solutions found it hard to identify where money could be made in the local e-health market [24].

CHIK Services Pty Ltd also suggest that the use of ICTs within the health care settings has been shaped by the relatively small size of the local market and the specific geographic, political and demographic nature of Australia and the healthcare system [24]. This opinion supports the findings of a review undertaken in 2004 by the Boston Consulting Group on behalf NHIG and AHIC.

The review aimed to identify major health IM&ICT initiatives planned or in progress, and to identify priorities for national involvement [14]. This was the first step in the development of a revised national health information and information & communications strategy. The review identified over 360 major health IM&ICT initiatives planned or in progress across all jurisdictions in both the public and academic sectors.

The reviewers emphasised whilst there was widespread consensus among stakeholders that the underlying rationale for IM&ICT-driven health reform is to improve health outcomes whilst containing health system costs, a number of different stakeholder groups were pursuing a range of different outcomes. Projects were small in size, varied in purpose and were largely independent with some activities aimed at building innovative systems that were often incompatible or unconnected. A number of interviewed stakeholders believed
they were overburdened with multiple initiatives, and did not have a clear picture of the outcome to which they were contributing.

There appeared to be duplication across jurisdictions of some activities that could be more efficiently and effectively performed at the national level, such as patient and provider identification. Areas identified as potentially benefiting from a national coordinated approach included standards development and provider information provision.

The review also highlighted the difficulties of developing health IM&ICT business cases. Under half of the reported initiatives had a scoped business case, and only a handful of those identified the quantifiable financial, clinical or outcomes-based benefits to be achieved within a certain timeframe. Stakeholders repeatedly raised this issue as a major obstacle to progress. The view is that the longer term, more diffuse and less visible payback from health IM&ICT investment, relative to other initiatives, has contributed to underfunding.

Outcomes from a recent workshop in 2007 on implementing a rational e-health system in Australia suggest the local ICT market still appears to be in a state of flux.

Characterized the Australian health care system as “devoid of market and full of failure” ... The traditional impulse in the health system was to hoard knowledge rather than share it. (Ian Carmody – Chief Operating Officer, NeHTA)

“... high direct costs of EHR and agreed that a process by which the government ‘picks winners’ locks practice into a particular system that may not prove to be the best. (Prof Bruce Barraclough – Medical Director, e-Health Research Centre, [25])

The role of ICTs in primary health care has been shaped by the development of several government initiatives in response to increased emphasis on effective chronic disease management and continuous quality improvement. [26-28]

In the ACCHS sector, the importance of using ICTs was recognised in the late 1990’s when funding was allocated to services to assist with the introduction of data and recall systems. The grants included the provision of the patient information and recall software, hardware,
and training and support services from three recommended providers. The providers and their products had to satisfy a set of core requirements specified by OATSIH such as having a comprehensive client record and patient recall facility; a health care planning facility based on health problem type; and be configurable to meet the specific needs of the service. The providers included Pen Computer Systems (Ferret); Medisys Australia (Commucare) and Working Systems (Chiron Plus). It appears the most commonly used applications are Communicare and Ferret.

The influence of government funded initiatives was also demonstrated in the implementation of the Ferret system in many of the remote PHC services funded by Queensland Health. The Ferret system was part of the EMPHC initiative and was implemented by the Better Health Outcomes Project (BHOP) to help coordinate the health care of patients by ensuring people with chronic disease received tests and treatments on time and health checks were undertaken to screen patients for any health problems. The Ferret system allowed services to be networked on the Queensland Health intranet and enabled Queensland Health staff in all facilities to access client records from another participating facility. The BHOP team and the software suppliers were responsible for the maintenance of the Ferret system and an ICT team within the District Office coordinated the support and maintenance of the hardware.

In the private GP sector, apart from funding initiatives such as Broadband for Health and HealthConnect, many of the private GPs have independently purchased the ICT system for the practice. According to Western et al general practice software includes many administrative software programs, each with relatively small market share. The most population applications were Medical Director (63%); MYOB (14%); and Medical Spectrum (now IBA; 8%).

In 2004, Medical Director (63%) was overwhelmingly the market leader, followed by Medical Spectrum (7%) and MIMS Script (5%).
support clinical functions such as assessment, care plan, clinical documentation, and prescribing [24].

**Monitoring health system performance**

The effective management of information and IT plays a vital role in improving the quality of health care through several mechanisms, such as monitoring health system performance. Technology can provide targeted and timely information at key decision points along the path of diagnosis and treatment, allowing practitioners to deliver more effective and higher quality care, and administrators to more effectively manage their resources and service delivery [35].

According to the Australian Council for Safety and Quality in Health Care, there are serious quality problems within our health care system. Unaddressed, they might lead to significant human and social costs, such as pain and suffering, diminished ability to function, reduced productivity and even death [36]. In the light of this, together with the increasing prevalence of chronic diseases, the growing demand for care, rising health costs, constrained resources and evidence of variations in clinical practice, the performance of health care services is under increased scrutiny [1].

The assessment of the performance of health care systems involves the addressing of two questions:

1. What is currently being achieved (‘attainment’) with respect to three objectives?
   - good health,
   - responsiveness, and
   - fair financial contribution, and

2. What is the best which could be achieved with the same resources? (‘performance’) [1]

Campbell *et al* suggest that health care system performance has moved away from assessing costs and activity to assessing quality, with an emphasis on both the efficient use of resources and on the effectiveness of health care [37].
The process for measuring health care system performance involves developing evidenced-based measures and benchmarks (performance indicators) within a performance monitoring framework. The National Health Performance Committee (NHPC) suggests the health performance indicators should:

- be worth measuring,
- be measurable for diverse populations,
- be understood by people who need to act,
- galvanise action,
- be relevant to policy and practice,
- reflect results of actions when measured over time,
- be feasible to collect and report, and
- comply with national processes of data definitions

A number of health performance frameworks and performance indicators exist [38-42]. Although performance indicators might elicit data which provides an indication of health care service achievement, such data require further analysis and interpretation in order to be transformed into information which could be useful within the context of the service. As suggested by the NHPC,

*Performance information does not exist in isolation and is not an end in itself, rather it provides a tool that allows opinions to be formed and decisions made* [43].

The performance monitoring process also depends on several additional but necessary factors, such as good quality data and information, functional ICT systems and the availability of a skilled workforce [44]. According to the Australian Council for Safety and Quality in Health Care, whilst high quality data are available in some areas, data on some important issues are quite limited.
The world-wide goal of improving health care system performance is expected to have a carry-on effect in improving the health of populations and reducing inequalities in the distribution of health care across subgroups within populations.

**Part B – Specific Topics**

Part B is divided into five smaller subject areas specific to this study.

I first describe the prevalence of type-2 diabetes and then outline the components of the care of patients with diabetes. I follow this with a description of the models of PHC service in Australia. In the last two subject areas, I describe IT in PHC and the performance monitoring of PHC services.

**Prevalence of Type-2 diabetes**

Of the chronic diseases, type-2 diabetes has been described as a worldwide epidemic [45, 46]. According to King et al, 150 million people have diabetes. This number is expected to increase to 300 million by the year 2025, due to the rise of type-2 diabetes [47].

Due to changes in population demography, changes in lifestyle and an increase in risk factor behaviours (such as smoking and poor diet), the prevalence of type-2 diabetes is increasing at a greater rate than any other chronic disease in Australia [3]. The AusDiab study reported that, in 2000, 7.4 percent of the Australian population aged 25 years and over (approximately 900,000 people) had diabetes. Of these people, 90 percent had type-2 diabetes[48]. The prevalence of diabetes is higher in Aboriginal and Torres Strait Islander populations and is also increasing in younger age groups in the general Australian population, with cases now even being seen in children and young people [49]. The overall cost of caring for people with type-2 diabetes in Australia is estimated to be in excess of $3billion [50].

In people with diabetes blood glucose levels become too high because the body produces little or no insulin, or cannot use insulin properly. Diabetes is most likely to develop after 40 years of age and may initially be present without symptoms [49]. Up to half of all people with type-2 diabetes are not aware that they have it [48, 50].

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Undiagnosed or poorly managed type-2 diabetes is associated with short-term and long-term complications (such as vascular disease, neuropathy and disability) and is one of the major causes of death. Over the period 2001 to 2003, there were approximately 20,908 diabetes-related deaths registered in Australia for people aged 25 years or over. This represents 5 percent of all deaths registered over this period [49].

Components of the care of patients with diabetes
The care of patients with diabetes is complex and lifelong. The aims are to improve the person’s quality of life and prevent premature death. The principles of care include:

- access to timely and continuing care from a multidisciplinary team with specific training and experience in the care of patients with diabetes,
- access to information, education, and skills to support self-care,
- access to high quality health services, regardless of financial status, cultural background or place of residence, and
- routine monitoring and evaluation of the disease and of patient outcomes [51].

Following a diagnosis of diabetes, the initial approach might involve establishing treatment goals, developing a care plan and providing care for complications which might arise. Patient education and continuing support are central to this process.

The following paragraphs outline and describe the components of the care of patients with diabetes. These include the multidisciplinary team approach, evidence-based clinical guidelines, disease registers, routine follow-up and review, baseline reporting and patient self-care.

The Multidisciplinary Team Approach
The ideal multidisciplinary team would include a GP, a diabetes educator, a dietician, a podiatrist, an endocrinologist or diabetologist, an ophthalmologist or optometrist, an oral health professional, an exercise professional and specialist counsellors [52]. There are
several medical approaches to the care of patients with diabetes. These might involve just the GP or the specialist or a ‘shared-care’ arrangement between specialist and GP.

The role of the GP within such a multidisciplinary team involves initial diagnosis, treatment, co-ordination of the services of the consultant and the allied health professionals and continuing care of the patient, which includes educating and counselling patients and their family or other carers in the home.

The guidelines of both Diabetes Australia and the Royal Australian College of General Practitioners (RACGP) emphasise that good communication between team members, based on mutual trust and respect, is essential for a successful team-based approach.

Clinical Guidelines

Clinical guidelines are systematically generated statements designed to assist health care clinicians and patients to make informed decisions about appropriate treatment in specific circumstances. The diabetes guidelines promote a consistent approach to treatment and improve the quality of care [53].

The guidelines recommend:

- blood pressure, height, weight, waist circumference and foot examinations every 6 months,
- testing of glycaemia (level of glucose in the blood) control (HbA1c), blood lipids and microalbuminuria annually,
- retinal examination at least every 2 years, and
- an annual review of risk factors (eg, smoking, alcohol), and of a plan for healthy eating, physical activity, education in self-care and medications [52, 54].

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Disease Register

A diabetes register is a list of all patients with diabetes registered with the PHC service [52]. The register is used to track a patient’s clinical status and their need for ongoing care. It is also useful for population health purposes such as identifying target groups for specific health strategies and monitoring the need within populations to assist with planning and with evaluation activities [55]. Information recorded in such a disease register includes patients’ names, their basic demographic details and their unique record numbers. The maintenance of the register requires regular monitoring and updating, particularly to reflect patients’ deaths and changes in contact details.

Follow-up and Review

The follow-up and review process is organised around the clinical guidelines and is facilitated by the use of a recall and reminder system, flow charts and review charts.

Recall and reminder

A recall is an action that is usually performed when the outcome of a test is abnormal and when it is appropriate that the patient return to the practice [56]. A reminder is an action that is usually performed to prevent illness.

A ‘recall and reminder’ system (paper based or electronic) facilitates the timely recall of patients when certain aspects of their care require review, such as a recall to discuss abnormal blood test results or a reminder to attend an overdue 3-month diabetes check [52]. The system provides support both to clinicians and patients to adhere to recommendations for screening and review and supports the implementation of best practice.

Flow charts and review charts

The flow charts and review charts are included in the patients’ medical notes. A flow chart outlines the patient’s clinical parameters and flags when interventions or investigations are necessary [52]. A review chart is a checklist for regular reviews to facilitate thorough coverage of all issues at each visit.
Patient Self-care

The patient’s active involvement is a key element in their effective care [57]. Patient self-care involves the patient’s making day-to-day decisions about their illness, which includes monitoring blood glucose levels, adherence to dietary and physical activity regimes and compliance with specialist and follow-up appointments [52]. Patient self-care also requires appropriate support from the PHC service [8].

Baseline Reporting

Baseline reporting is part of the continuous quality improvement cycle (CQI). CQI in health care is defined as ‘a structured organisational process for involving personnel in planning and executing a continuous stream of improvements in systems in order to provide quality health care that meets or exceeds customer expectations’ [58].

The Office of Aboriginal and Torres Strait Islander Health’ (OATSIH) Healthy for Life (HfL) program has nominated three evaluation activities which might form the basis of the PHC services’ baseline reporting process [59]. These include ‘clinical chart auditing’, ‘process mapping’ and ‘health systems assessment’.

The clinical chart audit is a process of comparing information in the medical record and in the information systems with the standard protocols or criteria for the delivery of a given item of care. Process mapping describes the working of the health service, for example, the steps involved from a client’s arrival at the health service for treatment until they leave for home. Health systems assessment assesses a range of elements of the health care service system which are important in delivering effective care of patients with chronic illnesses.

These evaluation activities are expected to provide baseline data to compare with similar data and information collected over time, enabling the PHC service to identify priorities for improvement and to monitor the service’s progress towards achieving its goals.
Role of information management in the care of patients with diabetes

The role of ICTs in managing chronic diseases was to allow easier access to timely and relevant data about individual patients and populations in order to improve patient care, promote prevention activities, improve practice management and provide continuity of information transfer between primary, community and hospital services. [8, 20]

The management of information and the use of ICTs to support the care of patients with chronic disease, such as diabetes, are identified as two of the six elements in the chronic care model [8]. Wagner et al suggest ‘most practices do not have standardized or organized approaches to collecting, summarizing and reviewing individual or aggregate patient data to facilitate care’. They emphasise that clinical information systems ‘enables care teams to call in patients with specific needs, deliver planned care, receive feedback, and implement reminder systems’.

There are a large number of ICT applications within the clinical environment, such as the electronic health record, patient billing systems, clinical information systems, and performance management systems [13]. The increase in implementation and use of these systems reflects the shift in policy towards an e-health agenda [13] [14] [35]. It is anticipated e-health will:

- allow the Australian health sector to operate as an inter-connected system
- facilitate continuous improvement of the health system, and
- place the right information in the hands of care providers, consumers and health care managers to enable the delivery of safe and more effective health outcomes for the Australian population [13] [14].

Models of primary health care services in Australia

The following paragraphs describe the three models of PHC service in Australia:

- Aboriginal community-controlled health care service (ACCHS),
- Community health care service (CHS), and
• Private general practice (GP).

**Aboriginal Community-Controlled Health Services**

The ACCHSs are independent non-government organisations established by Aboriginal and/or Torres Strait Islander people within the community in which each ACCHS is based. The services aim to deliver holistic and culturally appropriate primary health care services to Aboriginal and/or Torres Strait Islander people [60]. Each ACCHS is governed by an elected Aboriginal and/or Torres Strait Islander Board of Management and a team of senior managers.

The ACCHSs receive the bulk of their funds as program grants from the Commonwealth government. Additional funds are obtained from Medicare billing and from joint initiatives with that state’s Department of Health [61]. The ACCHSs, based on their geographical location, are represented by a state or territory ACCHS affiliate and at the national level by the National Aboriginal Community Controlled Health Organisation (NACCHO).

The emergence of the chronic disease model of care within the ACCHS is influenced by a number of external initiatives, such as the enhanced primary care package (EPC), continuous improvement projects (CIP) and the healthy for life (HfL) program [62, 63]. The CIP and HfL programs are discussed later in the topic regarding performance monitoring in PHC.

The EPC, CIP and HfL programs have enabled the ACCHSs to establish and develop systems of care for patients with chronic diseases within a quality improvement framework. Associated with these developments is a change in the model of reporting. Previously, ACCHSs reported on their service activity as part of their funding arrangements with the Office of Aboriginal and Torres Strait Islander Health. These reports included a service activity report (SAR) and a service development and reporting framework (SRDF) [63, 64]. With increased emphasis on quality improvement, the reporting model has changed, to focus more on reporting against evidence-based performance indicators. This is detailed further in the discussion of performance monitoring in PHC.
Community Health Service

In Australia, each of the states and territories has state-governed CHSs, which vary in structure, size and role. My thesis focuses specifically on a CHS model in Queensland.

The CHSs in Queensland aim to improve the health and well-being of individuals and communities and to prevent the progress of disease and the associated need for secondary and tertiary care [65].

CHSs are part of a large, hierarchical state government department which is the responsibility of the Minister for Health. Each CHS is usually run by a senior management team consisting of a District Manager, a Director of Nursing, a Director of Medical Services and a Director of Corporate Services.

Due to the funding arrangement and the structure of the CHSs, the introduction of initiatives and changes to internal practice and processes are primarily determined by the Queensland Department of Health (Queensland Health). Initiatives, such as the Enhanced Model of Primary Health Care (EMPHC) were developed for CHSs in remote Indigenous communities in far north Queensland by a section of Queensland Health. This model was developed in response to feedback regarding the capacity and capability of CHSs in dealing with emerging health issues, such as chronic disease [31, 32]. The model was implemented in a select group of CHSs based in remote Indigenous communities. Its key components were:

- planning in partnership with the community;
- developing and implementing a chronic disease strategy;
- the use of an electronic recall and reminder system; and
- developing a skilled and confident workforce.

This model, particularly the chronic disease strategy, is a new approach to the care of patients with chronic diseases. It has an increased focus on improving community capacity and governance structures, ensuring a high quality of health care service delivery, improved
support for self-care, effective use of information and decision support systems and improving workforce capacity [55]. Associated with this shift in the model of care and an increased focus on quality improvement is a change in the model of reporting.

Reports regarding service activity and chart auditing are undertaken on a regular basis within the CHS. The reports are used primarily by the district health offices to assist with resource allocation and some performance monitoring.

**Private General Practice**

Private general practice is described as part of the front line of health care with a twin focus, both on individuals and their society and was primarily orientated around providing acute care services [66]. The practices are usually owned by one or more general practitioners, although there has been a trend, in recent years, to the amalgamation of smaller practices. The larger practices have a sizeable workforce which might include additional GPs, practice managers, administrative staff, registered nurses and allied health practitioners. They might be governed by one or more principal owners and/or a board of GP directors.

Private general practices receive the bulk of their funding from the billing of patients, with some additional funds being received from state and commonwealth program grants and research programs. Many practices are voluntary members of geographically-based Divisions of GP, which have both state/territory and national peak bodies. The roles of the divisions include supporting their members and representing GPs at local, state and national forums [67].

As most practices are privately owned, the implementation of initiatives and changes to practice and processes are determined by the owner/s. Government incentives such as the enhanced primary care package (EPC) have encouraged the incorporation of components of the chronic disease model of care and quality improvement activities into general practice [68, 69].
In 1999, the Commonwealth government introduced the EPC package as part of the Medicare Benefits Scheme. The package aimed to improve the health of older Australians and people of any age with a chronic medical condition and complex needs (such as diabetes with complications). This involves regular health checks for older people and better coordination of care for people with chronic diseases and complex care needs. The EPC items include voluntary annual health assessment for Indigenous Australians aged 55 years and over and for other Australians aged 75 years and over and care planning and case conferencing services for patients with chronic diseases and complex care needs. GPs engaged in implementing EPC items are eligible for a specific Medicare payment.

Because general practices are privately owned and are not under government control, the level of reporting to external bodies such as the divisions of GP is variable. At present, there is minimal requirement for general practices to report on service activity and performance. However, some practices recognise the importance of quality improvement and are voluntarily engaging in activities such as practice accreditation, the National Quality and Performance System (NQPS) and the National Primary Care Collaboratives (NPCC) [70] – both described below.

General practice accreditation 'is the longest established and most widely known process for the external evaluation of healthcare services' [71]. The two organisations involved in accrediting health services are AGPAL and Quality in Practice (QIP). AGPAL accredits general practice and QIP accredits optometry and physiotherapy.

The NPCC, also known as the Australian Primary Care Collaboratives, is a 3-year program [65] funded in 2003 by the Commonwealth government. The NPCC is a Continuous Quality Improvement initiative which aims to help GPs and PHC providers work together to improve clinical outcomes, reduce lifestyle risk factors, help maintain good health for those with chronic and complex conditions and promote a culture of quality improvement in PHC. The diabetes reporting requirements include:

- the number of patients on the diabetes register;
• the percentage of patients with diabetes with a last recorded HbA1c of ≤ 7.0% within the previous 12 months;

• the percentage of patients with diabetes with a last measured total cholesterol of <4 mmol/l within the previous 12 months;

• the percentage of patients with diabetes with a last recorded blood pressure (BP) reading of <130/80 mm Hg within the previous 12 months; and

• the percentage of patients with diabetes for whom a GP has claimed diabetes service incentive payments within the last 12 months.

Information technology in primary health care services

Here I describe the role of IT in PHC and the pattern of IT use in PHC services.

The use of IT systems within the PHC sector was influenced by increased emphasis on the effective care of patients with chronic diseases and on continuous quality improvement, and by the provision of government-funded IT incentives [26-28].

IT systems provide a platform for the health system to be interconnected, allowing individual providers to share applications, and information and knowledge resources. The following portrayal by Liaw and Tomlins describes the role of IT in PHC where,

"GPs will be using systems connected to one another reversibly and securely via the internet, and sharing applications, utilities, information and knowledge resources among themselves and with other members of the health team. They will be able to move easily from one desktop workstation system to another and from one location to another without losing patient or practice information. Patient information will be collected and captured directly, at point of care, by GPs using relevant clinical terminologies, which are consistently mapped to and represented by a reference terminology. The reference terminology may, in turn, be mapped to appropriate classifications to enable population health and epidemiological research. The consistent representation of patient and health information will enable electronic health records to articulate with information and knowledge resources through electronic decision support systems at the point of care. Evidence based best practice guidelines will be incorporated into and improve clinical decisions, increasing the benefit for GPs who record patient information electronically. Integrating clinical
with practice management information will improve understanding of the relationship of quality of care to the business of general practice, contributing to greater sustainability. The collection and management of accurate and comprehensive practice and population data, as a by-product of good clinical care and record keeping, will promote the sustainable collection and use of patient-centred clinical information to improve the health care and health of individuals and populations” [34].

The development of IM&ICT policies in health aimed to:

- provide information-based resources to improve patient care,
- promote health prevention initiatives,
- improve practice management, and
- provide continuity of information transfer between primary, community and hospital services [20].

Lovell and Celler suggest, however, that IT in the primary health care setting has, until recently, been presented as a tool for practice management rather than as a tool for supporting, improving and making more efficient the professional practice of medicine and the delivery of health care to both patients and the community [20].

According to them, the practice management systems in use:

- have limited integrated communications capability (with communications-dependent applications being a rarity),
- cannot either send or receive patient data conveniently, and
- make no contribution to public sector databases on epidemiological, educational and public health issues.

Apart from some applications for dial-in access to pathology results, the telephone and fax machine remain the most commonly used forms of communication. Whilst the authors suggest that many medical practitioners were initially sceptical and lacked enthusiasm in
using the systems, it appears the level of computerisation in general practice (50-60% in 1999) has increased.

Western et al suggest the majority (89%) of Australian general practices are using computers. There does not appear to be any significant difference in computer usage between states or between urban and rural practices [33]. However, similar to Lovell and Celler's findings, IT systems were used mostly for general administrative work (accounting, billing and simple office management), less for patient-orientated administration, and least for clinical use. The main clinical use included writing prescriptions, recording progress notes, preparing referral letters, downloading pathology results and organising recall and reminders.

Western et al suggest although GPs feared the loss of data, and an unknown and potential loss of income, they appeared, overall, to be satisfied with their existing systems, believing the computers useful because they supported the management of vast amounts of information involved in general practice, made it easier to run recall systems, identified dangerous drug interactions, improved GPs' time efficiency, and allayed medico-legal concerns through the keeping of good records. GPs also tended to find computers easy to use because the current hardware and software met their basic needs and used a limited range of functions with which they were comfortable. Western et al suggest that GPs were confident that, given practice, persistence and time, they could develop the necessary computer skills.

In the ACCHS sector, a report developed in 2006 on IT infrastructure in Commonwealth funded Aboriginal Community Controlled Services, identified wide acceptance of the benefits of IT in medical service delivery, from both administrative and medical staff [30]. However, it also suggested that the services were at various stages of maturity in their IT infrastructure. The services who participated in the stocktake were ranked according to findings from on-site visits and telephone surveys. Most services were at levels 2 (functional IT infrastructure; collecting...
capability and use of PIRS and only a small number were capable of taking full advantage of the functionality of the PIRS.

In the state government sector, the Forster Review described the 'overall Information Systems Delivery environment in Queensland Health is recognized as being in need of improvement' [18]. There was evidence of a history of significant problems with enterprise applications; lack of information management skills among clinical staff contributing to the perception that ICT projects are often viewed as technical solutions that are the responsibility of IT to deliver, rather than as an opportunity to improve work practice and productivity; and very low satisfaction level with the delivery and support of ICT services.13

Performance Monitoring of Primary Health Care Services

As previously mentioned, the effective management of information and IT plays a vital role in improving the quality of health care through several mechanisms, such as monitoring health system performance.

In the PHC sector, performance monitoring frameworks and performance indicators are becoming increasingly evident as demonstrated by the NQPS for the divisions of GP and of the Northern Territory Key Performance Indicators (KPI) [40, 42]. The NQPS is based on the conceptual framework for performance assessment in primary health care (FPA-PHC) proposed by Sibthorpe and Gardner. This measures performance against a defined set of

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the data on patients including the demographic details and their health status/conditions, primarily for annual reporting; paper based is still maintained as the primary record or as a back up) or 3 (moving all patient records to electronic form (and in some cases using electronic pathology reporting); support and involvement by all relevant staff for electronic record keeping; use of electronic prescribing function; active efforts made to maintain PIRS data accuracy and security; greater emphasis on IT infrastructure security and reliability; and reliable patient information leads to more consistent and efficient patient care).

13 In response to the Forster Review, Queensland Health has since developed and commenced implementing its eHealth Strategy that describes their initiatives to improve the ICT environment. (Ref: Deloitte. Queensland Health eHealth Strategy. (2006) Queensland)
objectives [33]. It involves reporting against a set of evidence-based performance indicators to measure four elements of a PHC service:

- stewardship;
- organisational structures and processes;
- processes of care; and
- intermediate outcomes.

It is hoped that the performance monitoring process will become a regular activity undertaken by each PHC service and that it will form part of the service's CQI process.

A CQI project, the Continuous Improvement Projects in the Early Detection and Management of Chronic Disease for Aboriginal and Torres Strait Islander people (CIPS) was also implemented in some ACCH services in 2003[72]. CIP, an OATSIH initiative, was based on the following principles:

- a primary health care focus;
- population-based care (included the development and maintenance of client registers and a systematic approach to care, which includes appropriate workforce development and the implementation of evidence-based guidelines for the planning of the care of patients with chronic illnesses);
- a focus on systems and processes;
- service development through quality improvement cycles (cycles of information gathering, documentation, discussion and planning, action and review);
- provision of support mechanisms, and
- evaluation.

The CIP program has now ceased and OATSIH has since implemented the HfL program, a CQI initiative which aims to improve the quality of life for people with a chronic condition and, over time, to reduce the incidence of adult chronic disease [63]. There are over 80 PHC services involved in the HfL program.
The support, collection, analysis and reporting function, also known as SCARF, is part of the evaluation of the HfL program. SCARF aims to enhance the quality of primary health care for Aboriginal and Torres Strait Islander peoples through the development and service support, and to improve the quality, availability and use of healthcare-related information. A function of SCARF involves developing a set of performance indicators using the FPA-PHC. The HfL services are expected to report on these indicators at regular intervals and it is hoped that the services will use this information for quality improvement purposes.

As previously mentioned a similar performance monitoring system, the NQPS, was also implemented in the divisions of general practice.

It would seem that the key elements to ensuring that PHC services could successfully engage in these performance monitoring activities are effective data and information management and the use of IT.

**Research Questions**

Drawing together my personal experience and the findings from my literature review, my research questions were:

- How were patients with chronic diseases cared for by primary health care services, with a particular emphasis on the care of patients with diabetes?
- How were data and information managed by primary health care services to support the care of patients with chronic diseases, with particular emphasis on the care of patients with diabetes?
- Which service factors affected the management of data and information? and
- What are the implications of my findings for primary health care policy and practice?

Although data and information management and information communication technologies are inextricable, my thesis focuses specifically on the data and information management aspect within four Australian primary health care services: an Aboriginal community-
controlled health service, a community health service, and two private general practices, one rural and one urban.
Chapter 3 - Methods

In this chapter I describe the study design, theoretical background, methods and process of ethics approval.

Study design

My project, the Information Atlas Project, was a descriptive study comprising four case studies in three different primary health care settings: an ACCHS, a CHS, and two private general practices. The project commenced at the first site in April 2005 and feedback was completed in August 2006.

Darke et al have suggested that the case study approach is the most widely used qualitative method in information systems research and that it is well suited to understanding the interactions between information technology-related innovations and organisational contexts [73].

The case study approach is defined as empirical inquiries which investigate a contemporary phenomenon within a real-life context [74]. The approach is used when a ‘how’ or ‘why’ question is being asked about a contemporary set of events over which the investigator has little or no control. This approach involves combining data collection methods, such as archives, interviews, questionnaires and observations. The findings may be qualitative, quantitative or both. The case study might be used to provide description, to test a theory or to generate a theory.

I used the case study approach in order to better understand the nature and complexity of managing data and information to support the care of patients with diabetes within its natural setting, the primary health care service.

Theoretical Background

First, I describe the role of data and information management in private business and then define the terms: ‘data’, ‘information’, and ‘knowledge’. I then define ‘information management’ and describe each of its components.
Second, I discuss the role of information technology, the importance of fostering an information culture, and the importance of developing an information policy and information strategy. I conclude this section by describing the emergence of the scientific discipline, ‘health informatics’, which deals with the collection, storage, retrieval, communication and optimal use of health-related data, information and knowledge.

**The Role of Data and Information in the Private Business Sector**

In today’s economy, the success or failure of private businesses is influenced by their effective use of data, information and knowledge. They need to determine what is present, what is needed and what can and cannot be done with each [17, 75, 76].

According to management and organisation theory, the three distinct areas in which the creation and use of information plays a strategic role in determining an organisation’s capacity to grow and adapt are:

- searching and evaluating information in order to make important decisions;
- making sense of changes and developments in the external environment; and
- creating, organising and processing information in order to generate new knowledge through organisational learning [77].

**Definition of ‘Data’, ‘Information’ and ‘Knowledge’**

These terms are often used interchangeably. However, they are separate, but related, concepts [78, 79]. Data are the essential raw material of information. They are a set of discrete, objective facts about events, for example, numbers, names or quantities. Data describe only a part of what happens; they provide no judgment or interpretation and no sustainable basis for action [76, 80].

Information consists of data shaped into a form which is meaningful and useful, or knowledge made visible, or audible, in written or oral form [76, 81]. Information is dynamic and requires a sender and a recipient. It is the recipient who decides whether or not the message received is really information; that is, the message needs to inform the recipient of something, which will allow them to take appropriate action [79].
Unlike data and information, knowledge is a complex entity. As described by Davenport and Prusak (2000), “knowledge is a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of knowers” [79].

**Information Management**

Information management describes the measures required for the effective collection, storage, access, use and disposal of information to support organisational activities and processes [82]. A description of these components follows.

The management of data and information by health service providers is governed by 10 National Privacy Principles (NPPs) from Schedule 3 of the Privacy Act 1988 [83]. The NPPs pertain to data and information: collection, use and disclosure, data quality, data security, openness, access and correction, identifiers, anonymity, transborder data flows, and sensitive information.

In addition to the NPPs, there are state government information standards that define and promote best practice in acquiring, developing, managing, supporting and using information systems and technology infrastructure [84]. There are also privacy and security measures in place within the PHC sector to protect patient data and information. A description of the initiatives evident within each case study site is included in the case study chapters.

**Collection**

The collection of data and information involves the creation, acquisition or capture of data needed to support the organisation’s main activities. Health care services collect data and information through a variety of means:

- information provided by the patient during consultations,
- results received from laboratory tests and imaging techniques,
• correspondence received from other health care professionals and services, and
• demographic information provided to the receptionist.

Storage

Once data are collected, they must be stored in a manner which best supports the service’s activity. This involves the retention of data and information holdings in a variety of electronic and non-electronic (hard copy) forms.

Health information may be retained for an indefinite period, so that it is available, if necessary, to assist with the patient’s future diagnosis and treatment. The RACGP standards for General Practices recommends ‘that individual patient health records be retained for a minimum of 7 years from the date of last contact, or until the patient has reached the age of 25 years, whichever is the longer’.

The standard also recommends that inactive records are kept and stored securely and that they are retained indefinitely, or as stipulated by relevant state or territory legislation.

The storage facilities in health care services include paper-based and electronic information systems such as patient records, electronic medical records, libraries and computer databases. Once stored, the data and information must be accessible.

Access

Access involved three sequential activities:

- Searching and locating the appropriate holding (internally or externally);
- Retrieving or querying the required information; and
- The delivery of the information (or a copy thereof) to the user’s location.

Electronic information can be transmitted using communication networks or

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14 An inactive patient health record is a record of a patient who has not attended the practice for more than 2 years 85. Royal Australian College of General Practitioners, RACGP Standards for General Practice. 3rd ed. 2005, South Melbourne, Victoria: RACGP.
transferred using physical electronic media such as scanners and facsimile machines.

The sharing and exchange of information between agencies requires facilities for easy access to that information.

**Use**

Once information is accessed, it can be used in a variety of ways. The uses of data and information in health care include administrative purposes, such as practice records and practice management, clinical purposes such as clinical records and prescription writing, patient education, performance monitoring and quality improvement, and research and development.

**Disposal**

Sentencing is the process of identifying and classifying records according to a disposal authority and applying the specified disposal action [86]. It allows organizations to identify how long records should be retained, and ensure the process of disposing of records is completed in an authorized and managed way.

When information holdings are no longer required to support service activity, or the level of usage no longer warrants ready access, they need to be disposed of in an appropriate manner. Disposal can mean a number of different actions such as destroying the record or transferring it to archives or to another organization. The method of disposal requires consideration of the storage medium, value, use, demand and other business requirements. The benefits of disposing records that are no longer needed include reducing the level of resources required to store records that are no longer needed and making retrieval of information much easier as there are a limited number of records to sort through.

**Information Technology**

Effective information management is dependent, *inter alia*, on the type of information systems and information technologies available within an organisation and the presence of an information culture.
As mentioned in the previous chapter, IT encompasses all forms of technology used to create, store, exchange and use information [17]. The emergence of IT has changed the way work is done. The systems have increased the capacity of organisations to effectively collect data from their internal and external environment, to organise data into meaningful information, and to effectively distribute data and information to support the core business of the organisation.

The implementation of IT systems is important in ensuring their successful and effective application within an organisation [76]. The implementation process involves acquiring and/or integrating the organisation’s physical and conceptual resources to ensure that the IT system is well supported and accepted. Once implemented, the application of the system involves its use, a post-implementation review or audit, and regular maintenance to correct errors, keep systems current and make improvements.

Mukerji (writing in 2000) suggests the main problems associated with the unsuccessful application of an IT system are:

- poor IT system design, where the system fails to capture essential business requirements or to improve organisational performance and has a poor user interface;
- a high level of data inaccuracies or inconsistencies;
- expensive implementation and operation, which add no value to the performance of the organisation; and
- inefficient operation, so that information is not provided in a timely and efficient manner [76].

**Information Culture**

The effective use of IT to manage data and information also requires the presence of an ‘information culture’. Information culture is defined as a culture in which:

- the value and utility of information in achieving operational and strategic success are recognised;
• information forms the basis of organisational decision-making; and
• IT is readily utilised as an enabler for effective information systems [87].

The organisational elements which contribute to the development of an information culture include:

• effective communication flows;
• intra-organisational partnerships (that is, how well do the internal functions of the organisation work together);
• internal environmental factors (such as the capacity and capability of the workforce and their degree of trust in, enthusiasm for, support of, and cooperation with, the culture);
• presence of an information systems strategy (that is, one closely linked to the business strategy, with IT as an enabler of computerised information systems);
• effective data and information management practices (because the quality of the information depends on the integrity of the data on which it is based); and
• the presence of concise and clear documentation of key policies, processes and procedures regarding information systems management and information and data management[87].

**Information Policy and Information Strategy**

Several organisations, including private business, health services, and banking institutions have embarked on fostering an information culture within their organisations by developing an information policy and an information strategy. The information policy is founded on the organisation’s overall objectives and defines at a general level:

• the objectives of information use in the organisation,
• what ‘information’ means in the context of what the organisation’s business aims,
• the principles on which it will manage information,
• protocols for the use of human resources in managing information,
• protocols for the use of technology to support information management, and
• the principles it will apply in relation to establishing the cost-effectiveness of gathering, reliance on, and storage of, information [75].

The information strategy is the detailed expression of the information policy in terms of objectives and targets, and in terms of the actions needed to achieve them, and is the framework for the management of information [75].

It is hoped that the information policy and strategy, when supported by appropriate systems and technology, will prove to be vehicles to maintain, manage and apply an organisation’s information resources. Orna (writing in 1999) suggested that both were important to organisations in order to avoid risks and losses (such as uncoordinated information activities, inappropriate information activities, and failure to introduce innovative products and processes) and to gain positive benefits (such as the integration and use of all information resources and sources in order to achieve organisational objectives) [75].

‘Health Informatics’

In health care, there is a growing interest in the appropriate and innovative application of the concepts and technologies of information management to improve health care and health. This field of interest is known as health informatics, defined as an evolving scientific discipline which deals with the collection, storage, retrieval, communication and optimal use of health-related data, information and knowledge [88]. Whilst the field of health informatics encompasses a range of disciplines, eg clinical informatics, nursing informatics, public health informatics, imaging informatics, clinical research informatics and pharmacy informatics, there appears to be no sign of an informatics group dedicated to ’primary health care’.

Methods

I first describe the information audit method, then the role of my project advisory group, the processes involved in selecting the PHC sites, and the activities involved in the consultation process.
Following this, I describe my data collection methods, which include a document review, chart audit, process mapping and interviews. I then discuss my analysis of the quantitative and qualitative data and describe the events involved in presenting the findings back to the PHC services. I conclude this chapter with a description of the ethics approval process. The methods used for my project are presented in Figure 2.
Figure 2: Methods used in the Information Atlas Project (2006).

1. Information Audit Workshop
   - Adopted the audit method to identify, monitor, and evaluate an organisation's information flows and resources.

2. Selection of Sites
   - Criteria: based on the models of PHC services in Australia, size of their clinical workforce, specialisation in the care of patients with diabetes, and their use of an electronic patient information system.

3. Project Advisory Group
   - Role: To monitor the implementation and progress of the project to ensure that the processes were appropriate and acceptable to the whole service and to the community.

4. Consultation Process
   - 1. Introductory phone call
   - 2. Promotion package
   - 3. Face to face meeting

5. Document Review
   - Included annual reports, strategic plans, policy and procedure documents, position papers and other relevant material

6. Chart Audit
   - Chart audit of a randomly selected sub-set of 50 charts (medical records) of patients with diabetes

7. Process Map
   - To identify the resources, activities, and processes involved in the care of patients with diabetes; the management of data and information; and to support the care of patients with diabetes, and key service staff for my interviews.

8. Interviews
   - Informal discussions and interviews - key staff at the PHC services to obtain an understanding of the organisation and the processes involved in providing care to patients with diabetes

9. Analysis
   - Quantitative, Qualitative, and Case study chapters

10. Feedback Workshops
    - Provide contextual information regarding my findings; feedback on the accuracy of my results; and inform me of changes which had occurred within each service since the completion of my data collection.
**Information Audit**

In developing the method for this study, I adopted the methodological approaches used by Oma (writing in 1999) and Henczel and others (writing in 2001 and 2004) [75, 76, 89, 90]. This approach, the information audit, assesses the ‘strategic exploitation and effective management of information and enabling technologies in achieving organisational objectives’ within the private business sector.

The audit identifies, monitors, and evaluates an organisation’s information flows and resources in order to implement, maintain or improve the management of information [89]. Buchanan (writing in 1998) suggested that the audit was a necessary step for organisations to determine the value, function, and utility of information resources, in order to fully exploit their strategic potential.

The several approaches to conducting an information audit include the ‘InfoMap’, the information flow analysis and the integrated approach [75, 89, 91]. Buchanan’s integrated approach is based on an analysis of existing approaches and practical experiences within the university sector and involves five main stages:

- promotion of the audit to obtain support and cooperation from the organisation;
- top-down strategic analysis of the organisation’s mission, environment, structure and culture;
- analysis and evaluation of the organisation’s information resources;
- cost-analysis of the information resources and synthesis of the findings; and
- development of recommendations to provide an integrated strategic direction for the organisation’s future management of information [89].

**An Information Audit Workshop**

In order to better understand the information audit process, I attended an information audit workshop in Brisbane in 2004. Its purpose was to provide information professionals with an understanding of the practical skills needed to plan and conduct an audit.
The workshop was relevant to my project as it highlighted several factors important to my study method, including:

- prior to assessing information management, identifying and mapping the care activities of patients with diabetes within the PHC service,
- focusing specifically on information on the care of patients with diabetes to allow mapping of information within and external to the PHC service (ie, information held by visiting health professionals, programs and services),
- mapping information flows within the PHC service with respect to information relating to the care of patients with diabetes, and
- mapping interview questions to the overall research questions by developing a flowchart to ensure that the right questions are asked.

Minor adjustments were made to my research questions and to my study method to reflect these factors and to take into account the characteristics of each PHC service.

**Project Advisory Groups**

Project advisory groups were established for each participating site. The groups consisted of two of my supervisors and two representatives from each PHC service. The project advisory group was responsible for monitoring all aspects of my project to ensure that the processes were appropriate and acceptable to the whole service and to the community. The group was also responsible for addressing any complaints regarding the project. The group met at regular intervals via teleconference or face-to-face meetings.

**Selection of Cases**

The selection criteria was based on the models of primary health care services in Australia and on service factors, such as the size of their clinical workforce, specialisation in the care of patients with diabetes, and their use of an electronic patient information system. The selection of PHC services was affected by my residing in Brisbane. On the grounds of ready access, I chose the four Queensland models of PHC service.
In identifying potential PHC sites, I organized a meeting with representatives from the following organizations: Queensland Division of General Practice, Queensland Health, and the state office of the Commonwealth Department of Health and Ageing (OATSIH). I provided an overview of my project, which included the selection criteria for choosing sites. Based on this information, four PHC sites were identified and I was given information about the best way to approach each of these services.

In accordance with the above criteria, the PHC services which participated in my study included one ACCHS, one state government CHS and two private general practices. Because the project expected that there would be differences in the general practices due to their geographical location, one rural and one urban general practice were selected.

Each of the services studied comprised a workforce of at least two or more general practitioners and other members of a multidisciplinary team, such as registered nurses, Aboriginal health workers and allied health professionals; provided care to patients with diabetes and were using an electronic patient information system to support their care.

**Consultation process**

The consultation process involved an introductory phone call to each service’s Chief Executive Officer or Manager to introduce myself, to present my project proposal, and, if the representative was interested, to seek advice about how I could include their service in my research. Following the initial phone discussion, an introductory letter, information brochure, and my curriculum vitae were forwarded to the service, and followed up with a phone call.

Once the PHC service had endorsed the project, a formal face-to-face meeting was arranged with my principal supervisor and representatives from the service’s senior management team and/or board to discuss details. An ethics proposal was developed and submitted to the Human Research Ethics Committee at the ANU and to a committee nominated by each PHC service.

The promotional material developed for the PHC services (such as letters and an information brochure) were developed in consultation with each service and with two of
my colleagues who had had work experience in Aboriginal and Torres Strait Islander health research and primary health care services. I received feedback regarding my approach and the appropriateness of materials such as design, format and language.

"It would be good if you could spend some time just 'hanging out' in the organisation, like an orientation, just to get to know people and for people to get to know you. An MOU (Memorandum of Understanding) or a signed confidentiality statement would also be good." (Health worker/Researcher)

**Document Review**

To increase my understanding of each PHC service and its internal and external environment, I conducted a document review of relevant published and unpublished material. These documents included annual reports, strategic plans, policy and procedure documents, position papers and other relevant material. The documents were identified through my discussions with representatives of the service and via an Internet search using the Google search engine.

**Chart Audit**

To ascertain the nature and extent of the recording of information on the care of patients with diabetes, I undertook a retrospective chart audit of a randomly selected sub-set of 50 charts (medical records) of patients with diabetes.

The sources of data for the chart audit included the paper medical records as well as data stored in the electronic patient information systems. The eligibility criteria for the chart audit were that the patient had a confirmed diagnosis of type-2 diabetes, had visited the PHC service at least twice within the last 2 years and who had a registered address within the local post code area. The registered address within the local post code area was included in the eligibility criteria as a method of trying to capture the Service’s regular clients. Charts which did not meet the criteria were excluded from the audit and a replacement chart was selected from the randomly generated list.

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\[15\] In Australia there are some difficulties in trying to make a standard definition of 'regular client' for PHC services. One difficult is that some people regularly use different services, so would be
Individual patient consent was not obtained at three of my four sites, because my project was recognised as a quality improvement activity for the service. Individual patient consent was required for the patient population of the urban general practice.

Obtaining patient consent in the urban general practice involved mailing letters to 505 registered patients with diabetes. Patients who declined to have their charts included in the audit completed a ‘do not approve’ section in their letter and returned it in an enclosed return-addressed stamped envelope. Ten letters were returned as the patient’s address was incorrect, 12 advised that the patient had died, and 96 did not consent. Of the remaining 387 charts, 192 were excluded as the patient’s registered address was beyond the local post code. The 50 charts included in the audit were randomly selected from the remaining 195.

The selection of charts within the ACCHS, CHS and rural general practice involved obtaining a list of patients with type-2 diabetes from either the paper-based register or the electronic patient information system. This list was randomly shuffled using Microsoft’s Excel program, with the first 50 charts being selected. As previously mentioned, charts which did not fit the criteria were excluded and a replacement chart was selected from the randomly generated list.

I developed a data capture sheet based on the diabetes clinical sheet issued by the Audit and Best Practice for Chronic Disease (ABCD) project and on the clinical guidelines for diabetes management in general practice [52, 93]. The audit collected the following information from the charts:

- the patient’s contact details,
- the patient’s risk factors,
- key summary information, and

\[52\]

\[\text{a 'regular client' of a number of services. Another difficulty is that PHC services operate in a variety of different settings, with different populations and varying availability of other local health services. Patient information systems also differ between services.} \text{Bailie, R., } \text{What is a 'Regular Client'? A proposed standard definition for calculation of Healthy for Life performance indicators.} \text{. 2007, Menzies School of Health Research: Darwin.} \]
information relating to their care as patients with diabetes, such as height, blood pressure, glycosylated haemoglobin (HbA1c), weight, waist circumference, body mass index (BMI) and checks of retinas and feet.

Following piloting of the data capture sheet for my audit at the ACCHS site, refinements were made to improve the quality of the data collection. I identified three inconsistencies between the protocol for the care of patients with diabetes and the protocol I used for my chart audit.

The RACGP’s clinical guidelines suggest that the recorded blood sugar levels (BSL) should be of those tested at home, that the BMI be assessed 3-monthly, and that retinal examination be performed every 2 years.

However, I recorded the presence of BSL measurements from tests performed by the clinicians and collected information regarding BMI tests and retinal examinations which had been done at yearly intervals. This error was identified before my audit at the other sites, but to maintain consistency across all sites, this aspect of the audit was not changed.

As part of best practice in PHC care, I recognised the importance of adhering to the RACGP’s clinical guidelines for the care of patients with diabetes. The data collected from each of the PHC services used the same protocol and supported my objective of comparing the data collection and recording patterns of items in the care of patients with diabetes.

Data collected from the chart audit was stored in a secure and lockable cabinet, and will be retained at the Australian National University for seven years.

**Process Map**

Process mapping consists of constructing a model that shows the relationship between the activities, people, data and objectives involved in the production or support of a particular activity or output [94]. Process maps are developed to provide useful and relatively inexpensive descriptions of business processes.
During the Information Audit workshop, I was advised to map the information flows of an organization in order to obtain a visual representation that would identify bottlenecks and inefficiencies, information gatekeepers and dead ends [75].

The maps were developed to identify:

- the resources, activities, and processes involved in the care of patients with diabetes,
- the resources, activities, and processes involved in the management of data and information to support the care of patients with diabetes, and
- key service staff for my interviews.

However, an added benefit of the process maps was that they assisted in the analysis and interpretation of the quantitative and qualitative data according to my study’s research questions.

Prior to collecting data for the process maps, patients were informed by the reception staff of the process mapping activity and also through the placement of my promotional posters and information brochures in the waiting areas.

Individual consent was obtained before each clinical encounter to allow me to observe the interaction between the clinician and the patient. In my absence, the clinician first sought verbal consent from the patient to allow me to observe the clinical encounter. A record of this consent was recorded in the patient’s chart. I was then invited into the consulting room, where I confirmed the patient’s consent and recorded this in my records.

Between five and ten patient encounters per type of health care provider were observed until no new information was generated. The following details were recorded during my observation sessions:

- service details (ACCHS, CHS, rural general practice, urban general practice),
- program area (reception, clinic, diabetes clinic, outreach service, other),
- service provider (receptionist, doctor, nurse, Aboriginal health worker, specialist, other),
• type of consultation (new patient, review, other)
• patient consent, and
• chronological description of events involved in the clinical encounter (including a description of the information resource used to support each event).

I used the data from each of my participant observations, in combination with the qualitative data from the interviews, to construct the process maps. These did not include any identifying information, such as patients’ names, unique record numbers, test results or the name of the PHC service.

A process map was developed for the urban general practice but does not comprehensively represent the information flows as data was collected from general observations, interviews and informal discussion. Individual clinical observations were not done because the practice wanted to minimise the risk of allowing me to observe clinical encounters involving patients who had declined to participate.

**Interviews**

Informal discussions and interviews were held with key staff at the PHC services to obtain an understanding of the organisation and the processes involved in providing care to patients with diabetes. As previously mentioned, the interview questions were based on questions developed by Orna, by Henczel and by others, and was also based on my project’s research questions [75, 91].

These interview questions, which had initially been reviewed by two colleagues with work experience in Aboriginal and Torres Strait Islander health research and primary health care services, were piloted with a small number of staff, including a doctor, information manager, Aboriginal health worker and podiatrist, all from a small remote health service.

Feedback from the pilot highlighted the need to consider other areas relating to information management such as:

• medico-legal requirements,
• awareness of several databases,
• local health care system priorities, and
• the involvement of other programs in the care of patients with diabetes.

The piloting of the interview questions also generated discussions with clinicians and administrative staff regarding information management and provided me with a clearer insight into the extent of the problem within the PHC sector.

"It's not that the doctors don't want to use the system (Ferret), it's just problems with knowing how to use the system, having the skills and even if you do use the system, you don't get any feedback to inform your clinical practice." (Doctor)

"There are six health managers up there [Primary Health Care Centre] and I would say only two are forward thinkers and would use information to plan their program's activity." (Information Manager)

The refinement of my interview questions was also influenced by my findings from the document review and the outcomes of informal discussions with staff. The final set of questions covered issues regarding the care of patients with diabetes, information management, and those characteristics of the PHC service which affected both processes.

As previously mentioned, the process maps were used to identify potential interview participants, with the final selection being based on discussions with key PHC staff. The interview participants included members of the Board, senior management team, clinicians and administrative staff. The type of questions asked in each interview was dependent on the participant, for example, questions regarding investment in information communications technology were directed at senior management staff, while questions regarding blood pressure measurements were directed at clinical staff. The data collected from the interviews were stored in a secure and lockable cabinet at Australian National University, and will be retained for seven years.

Analysis

The analysis of the quantitative and qualitative data was based on the theories underpinning the care of patients with diabetes and relating to data and information management [75, 76, 91].
Quantitative analysis
The data from the chart audit were entered into a Microsoft Access database and analysed using SPSS version 12. Basic descriptive statistics such as proportions and means were calculated and the results for each PHC service were presented in tables, which appear below in each case study.

Qualitative analysis – Document Review, Process Map and Interviews

Analysis of the document review
The analysis of documents involved identifying and selecting documents relevant to my study. These included published and unpublished material such as annual reports, strategic plans, policy and procedure documents, position papers and other appropriate material.

The documents were catalogued and a reference list created for each PHC service. The key findings from each document were organised into a table and later used in conjunction with the interview findings.

Analysis of the process maps
The process maps were firstly developed by extracting, from my participant observations and the interviews, data specifically related to the care of patients with diabetes. From these data, the human resources (receptionist and doctor) and information resources (paper chart, electronic patient information system) involved in the process of care of patients with diabetes were identified and were chronologically arranged.

The data from each participant observation had been entered onto the map until no new data were obtained. The data from the interviews were used to validate the findings from my participant observations and to add new data to the maps. The process maps were constructed using the flow chart function in the computer program, Smart Draw 7.

The maps provided a visual representation of who had acquired or generated information, who had used it and how they had used it. From the maps, I was able to identify information loops (where information went from sender to recipient and back to the sender); duplications (where the same information was sent or retained by two
people); and dead ends (where information went from the sender to recipient, but did not go beyond). The maps also demonstrated the complexity of information flows to support diabetes patient management.

**Analysis of the interviews**

The qualitative data from the interviews were digitally recorded and then transcribed. The data from the transcripts were organised by interview questions into a table and each response was thematically analysed. The analysis was reviewed by my principal supervisor and I was advised to amend my approach.

The revised approach involved identifying the main components of chronic disease management; diabetes patient management; information management; and organization and management theory. The interview responses were analysed according to these components and organized in a table according to the research questions. The outcomes from my analyses were reviewed by my supervisory panel, which provided me with expert advice and critical reflection on my analyses method.

The main points identified from the document review and the interviews were categorised according to my research questions.

**Case study chapters**

The quantitative and qualitative data for each PHC service were collated into four case study chapters: ACCHS, CHS, rural general practice, and urban general practice.

The structure of each case study was organised around my first three research questions. Part A provided contextual information about the PHC service and part B described the process of care of patients with diabetes. This addressed my first research question. Part C addressed my second research question, which described the processes and flows of data and information in the care of these patients, and part D discussed the main findings and described the service factors which affected the management of data and information, which was my third research question. The main findings from each case study are drawn together in the concluding chapter, where the implications for primary health care policy and practice are discussed.
Feedback

Feedback of the results necessitated a workshop with management and staff at each PHC service and the development of a project report for that site. Feedback required my contacting the manager of the PHC service to organise an appropriate time to visit and to identify key people to invite to my presentation.

Once a date was confirmed, my principal supervisor and I visited three of the PHC services to present my findings. A workshop was organised with the urban general practice, but the meeting was postponed and I was unable to re-visit.

The participants at the workshops provided contextual information regarding my findings and also commented on the accuracy of the results. Changes which had occurred within each service since the completion of my data collection were also discussed. Following each workshop, a final project report was sent to each PHC service, with an invitation to managers to comment about the accuracy of the results.

Due to the small number of PHC services involved in the project, each service’s name and geographical location have been anonymised in all discussion, publications and presentations associated with this project.

Ethics approval

My project received ethics approval from the human research ethics committees at the ANU\textsuperscript{16} and at the Cairns Base Hospital\textsuperscript{17}. Ethics approval was also obtained from the ACCHS site\textsuperscript{18}[95].

My project adhered to the principles and guidelines outlined in the National Statement on Ethical Conduct in Research Involving Humans and the Values and Ethics: Guidelines for Ethical Conduct in Aboriginal and Torres Strait Islander Health Research [95].

\textsuperscript{16} Australian National University HREC protocol number 2005/87 – approved on the 18 May 2005
\textsuperscript{17} Cairns Base Hospital HREC protocol number 394 – approved on the 8 September 2005
\textsuperscript{18} ACCHS site – approved by ACCHS Board on the 18 January 2005
As previously described, my project also implemented additional measures to ensure that the project adhered to the above ethical principles, such as the development of a project advisory team and the endorsement of a research agreement with each PHC site.

The research agreement outlined my project’s ethical and legal considerations. The agreement was between my supervisors and each PHC service and, as such, was endorsed by the Executive Officer or Chairperson of that PHC service and by the Director of the Australian Primary Health Care Research Institute.

My contact details, as well as the contact details for my supervisory panel, the project advisory team, and the ethics committee were also published in all promotional material.
Chapter 4: An Aboriginal Community Controlled Health Service

As with all four case studies, part A provides contextual information about the PHC service, part B describes the process of care of patients with diabetes, part C describes the processes and flows of information in the care of these patients, while part D discusses the main findings and describes the service factors which affected the management of data and information.

The findings from all four case studies are drawn together in Chapter 8, where I discuss possible implications for PHC policy and practice.

This chapter has a particular focus on the general clinic branch of an Aboriginal Community Controlled Health Service (ACCHS). The IAP project commenced at this Service in April 2005 and feedback was completed by July 2006.

Part A – Contextual Information

Contextual information about the ACCHS’s social and geographical characteristics is followed by a description of the service, including catchment population and services, funding, structure, decision-making processes, information systems, quality improvement and training and professional development activities.

Social and Geographical Context

The ACCHS is based in a ‘large rural centre’ (RRMA 3 defined as having a population of 25,000 to 99,000) in North Queensland, approximately 2,000 kilometres northwest of the capital, Brisbane. [96] The centre is the region’s hub for both government and non-government services and for retail outlets [97, 98].

According to the 2001 Census, the total population living within the centre’s local government area (LGA) was approximately 120,000\(^{19}\), of whom 23% were under the age of 15 and 10% were aged 65 and over [98]. The highest level of schooling

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\(^{19}\) Excluding overseas visitors and persons counted within a nearby remote indigenous community.
completed by persons aged 15 years and over was Year 12 or equivalent (47%). The percentage of people employed within the 15 years and over age group was 65 %, with most working either in the retail industry or in the hospitality industry. The unemployment rate was 8%. The average number of people living in a household was 2.5 and the median weekly household income was between $700 and $799.

The Catchment Population and Services
The ACCHS was established in the late 1970s. The service aimed to improve the health of Aboriginal and Torres Strait Islander people by providing culturally valid and ‘holistic’ PHC services [96]. The ACCHS serves Aboriginal and Torres Strait Islander people living within the LGA and visitors from the surrounding rural and remote regions.

The proportion of people of Aboriginal and/or Torres Strait Islander descent living within the LGA was 8 percent. Within this group, 40% (3,549 people) were aged 0 to 14 years and 15% (1,320 people) were aged 46 years and over. The major causes of premature death and illness are stroke, atheromatous coronary artery heart disease, diabetes, suicide, unintentional injury and mental illness [99].

The services provided by the ACCHS included primary clinical care, such as general practice, visiting specialist clinics, care of patients with chronic diseases, and ‘health’ clinics dealing with sexual, women’s, ante- and post-natal, children’s, men’s, the over 50s’, diabetes, eye, hearing, dental (including a mobile dental unit) and social problems. The ACCHS also provided community education and support programs.

Funding
Core funding was provided by the Commonwealth Department of Health and Ageing, through OATSIH. As part of this arrangement, the ACCHS reports annually to OATSIH on its activity (eg, SAR, SDRF) and performance [40, 64].

Additional resources and funds were received through Medicare rebates, research and development grants and from Queensland Health.
**Structure**

The ACCHS is hierarchical, with several layers of management: a governing body of 12 elected Aboriginal and Torres Strait Islander community representatives; a senior management team, consisting of a chief executive officer (CEO), three branch executive officers and senior administration officers; and a middle management team, consisting of program managers. The program managers are responsible for coordinating the delivery of services by their operational staff.

The ACCHS has three branches: the main hub, of two branches, is based in a rural centre and the third branch in a smaller rural community. The hub is the centre for corporate and administrative services, the general clinic and the social health service [100].

The hub consisted, at that time, of 70 full-time staff, included eleven GPs, two registered nurses, Aboriginal health-workers, a dentist, social workers, counsellors, sports and recreation officers and administrative officers. [101]

**Decision-making**

Decision-making appeared to follow the lines of authority. As illustrated by the following quote, a training request from operational staff was submitted to their line manager, who forwarded the submission to the senior manager, who then passed it on to the CEO.

*Barriers are probably the pathways that have to happen from programs to the board, because there is a whole lot of line people that has to go through. It can either be stopped somewhere between them and the board and somebody else will try and deal with it, which may or may not be a good thing. (All)*

Although long-term staff appeared to be aware of the decision-making process, there was some uncertainty and confusion among new staff regarding the decision-making process and other internal policies and procedures.

*If I do want to do anything or have a concern, I could write a letter [to] inform the board and it’s up to the Board to decide and discuss it... I learnt that the hard way. When I first came here, [X] said to me, so I am your boss, I am the person you report to. I didn’t meet [Y] until two months later. That was when I finally*
learnt what my priorities were to be in the organisation, what sort of things I should be focussing on... I was going crazy, I didn’t know what team I’m part of, you’ve got me on full-time here and no-one ever sat down and said to me: okay as a full time [Z] at [ACCHS site] this is what we want you to do, these are the patients we want you to see. (A13)

A review of the ACCHS’s organisational structure had previously described ‘uncertainty about too many management decisions and everyone erred on the side of caution, deferring matters to the top which resulted in long timelines for decisions to be finalised, if at all’ [102].

Although the ACCHS had developed a ‘delegation of management’ manual to improve the reporting and decision-making process, there appeared to be few protocols and procedures to guide the staff. As described by an interview participant, there also appeared to be little association or communication between Board members and operational staff. 20

Personally, I wouldn’t know if the Board thinks I am doing a good job. I wouldn’t even know if the board knows me. I’m sure, if we weren’t doing a good job, we would hear about it. They tell us and let us know if we mucked up here. (A12)

Information Systems

Internal Use

Implementation:
The electronic patient information system, Genie, introduced in the early 1990s, was purchased on advice from an ACCHS GP, aware of the benefits of electronic recall and

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20 According to the National Aboriginal Health Strategy, “community control is the local community having control of issues that directly affect their community”. Implicit in this definition is the clear statement that Aboriginal people must determine and control the pace, shape, and manner of change and decision making at [all] levels (NAHS 1989a: xiv). The role of the Board within each ACCHS differs; within some there is a clear delineation between the role of the Board and the role of senior management. However, as highlighted in the first two quotes under decision making, it appears this ACCHS Board is involved making decisions about the management of staff.
reminder. *Genie* was later replaced, resulting in the use of two systems until data and information were manually transferred to the new one.

During this period, with the move of the ACCHS to a new site, the new network was found to be unable to support the two systems. The ACCHS cancelled the implementation of the new system and stopped using *Genie* because of inadequate resources and user support.

A few years later, the ACCHS received a grant from OATSIH to implement a new system. OATSIH had provided funds to eligible ACCHSs to select and purchase an electronic patient information system from three specified providers [27].

The government grant covered the hardware and software, training and support services. OATSIH also provided a reference guide, covering topics such as purchasing and maintenance costs, legislative requirements, environmental issues and workforce issues [29]. Additional funds were also offered for the employment of a person to enter the data and information from the paper medical charts into the system. With assistance from an external IT consultant, the ACCHS purchased and implemented the *Ferret* system.

*Application:*

At the time of my study, three patient information systems were present: the paper chart system and two electronic systems, *Medical Director (MD)* and *Ferret*. The paper chart was the primary record and was used in conjunction with the electronic systems.

*MD* was used primarily for clinical purposes but was not equipped with an analysis and reporting function. With increased external emphasis on the monitoring of performance, the ACCHS had decided to implement the second system, *Ferret*.

*It's [Medical Director] got all these new beaut things on it, but in actual fact it's not that helpful from a population health perspective... It's good for one-on-one stuff and it's really good for the doctors... We wanted the Ferret system so that the health-workers could click on it and say 'this group of patients that I have been intensively following up - this is how they are doing'. Rather than having to ask somebody else, then documenting and them giving you some analysis on it. (A11)*
Ferret was networked between the three branches, allowing access and sharing of patient data and information to authorised users.

The recording of data and information in three different files created extra work for administrative and clinical staff. In 2005, the general clinic moved to a paperless record-keeping system. A paper chart was, however, created to record each patient's initial consultation, but the majority of data and information regarding the patient was entered or scanned into MD's medical files. Ferret was abandoned because of the lack of resources to employ someone to transfer data from MD.

The IT systems were supported by the software provider and an external consultant. The software provider supported the applications such as MD. The consultant supported the IT hardware components and some of the other software applications. Technical support was provided via remote assistance, telephone, e-mail or on-site visits.

*Biggest problem is timeliness of IT support, takes a while for the person to get here to fix the problem. Ferret upgrades done by Pen computers, trying to have on-line access so upgrades can be done over the net and the support people don't have to fly from Sydney.* (Informal Discussion with Senior Manager)

The ACCHS was aware that the costs of using IT systems were recurrent and expensive. However, they appeared not to have adequately planned for the application of the systems. This was demonstrated in their approach to upgrading. Because the IT system was unable to support the number of additional users, upgrading was a priority for the ACCHS. The ACCHS applied unsuccessfully to OATSIH for additional funds to cover the costs of an upgrade, and of maintenance, support, training and professional development. The ACCHS, therefore, used their Medicare-generated funds. These funds were also used to fund planned activities and emerging priorities which had not been considered in the budget.

*IT support is very costly and an extra license for Ferret is about $6,000 dollars. The initial set up was $40,000 dollars and the IT contract for support is $25,000 dollars.* (Informal discussion with Senior Manager)

As illustrated by the following quote, the ACCHS was aware of the importance to future health service delivery of data and information management and IT use. It wanted
expert advice to assist in effectively using these resources. However, it appears that the resourcing of future upgrades, maintenance and training have to be weighed against other service priorities.

*With good information use, (we) need to have the right systems in place and have an appreciation of how information can be used, that is, where to direct energies.*

*(Informal discussion with senior manager)*

*We need to get somebody in to talk to us and the Board about what are the big issues here, what’s our future with this stuff, what are the implications, what do we need to be doing in thinking about this stuff, rather than adding stuff on and taking stuff off.* *(A11)*

**External Use**

The use of the system to exchange data with external users was limited because of privacy legislation and technical differences between operating systems.

The ACCHS shared administrative information, such as the billing of patients, with the Health Insurance Commission (HIC) and, with written patient consent, shared information with other health services and practitioners. Because the ACCHS was unable to electronically share clinical information with other health care providers, such information was retrieved from the patient’s electronic chart, printed, and either faxed or posted.

The extent of informal information systems and networks external to the general clinic was beyond the scope of my project.

**Quality Improvement Initiatives**

*As an acute health service, we did a good job and we outreach this community and did a lot of things well outside of health. But we knew patients were still getting sick and getting hospitalised. It made it really frustrating.* *(A11)*

In the past, the ACCHS had established disease specific programs, such as the diabetes program, to provide comprehensive essential care to patients with chronic disease. [103]

The diabetes team, consisting of a program manager, a GP, and two diabetes specific health-workers, were responsible for managing the follow-up appointments, home visits and education of patients. The program was held twice weekly, with a visit from the
endocrinologist fortnightly. The program ceased because of the loss of skilled staff [96, 103].

The ACCHS then became involved in several quality improvement activities, such as the CIP, to improve the care of patients with chronic diseases and the overall quality of their health care [62]. In the light of these initiatives, the ACCHS established a chronic disease clinic, recruited clinical staff to provide a multidisciplinary team-based approach to care, increased the monitoring of clinical activities, and provided chronic disease education and training workshops for staff.

The ACCHS also established partnerships with external organisations, such as Queensland Health and research institutions. Although the service had taken the initiative to introduce these systems for caring for patients with chronic disease, there were delays in implementing them.

This is a whole-of-health service approach...that has been presented through the full staff meetings plus the clinical staff meetings. Still probably everybody hasn’t got a handle on the details of that. It is not an add-on. It’s not a program. It’s the core business of the health service. The issues around that is that there are programs that are run like the chronic disease project, which are specialist, that are only one part of the service like kiddies’ clinic, men’s and women’s health, and educating the whole staff that the chronic disease stuff is not like that. (All)

Training and Professional Development

Staff training and professional development activities involved an orientation and induction program and a range of formal and informal training activities.

The orientation and induction program was offered to all new staff to provide an overview of the service’s history, philosophy and core business, an orientation to workplace health and safety policies and procedures, a tour of the service and an introduction to operational procedures. New employees were introduced to the ACCHS management and staff by electronic mail; formal introductions were made at a later staff meeting.

The staff professional development activities included the in-service training program for GPs and those training activities which were included in general staff meetings. The
in-service training for GPs was organised by the GP group. The training was provided each week and covered a range of relevant topics.

They did have doctor education sessions there before, because you get CME points for them, so we actually got the doctors’ sessions up and running fairly quickly. I did one thing on diabetes... I also went through renal disease, so I went through the principles of doing a GP management plan. (A14)

The training and development activities for non-GP staff were organised by senior management. They included the Workplace Employment Language and Literacy (WELL) Training in Business Communication. Informal training sessions were included in the general staff meetings, such as information session on CIP.

However, access to regular training and development activities regarding data and information management and IT was limited. It appears that information regarding new developments and changes were presented at staff meetings or via email.

Changes with Medicare - we get emailed things from X. I’ll print it out and read it. But that’s about it. Privacy Act was all things that was emailed to us, I went to just one workshop and that was it. None of the other staff went to it. A lot of the other training is how to deal with difficult clients and all of that, but nothing, none of us have had real training on the legal side of medical records. (A19)

As illustrated by the following quotes, there was interest among the staff in receiving regular training and professional development, similar to that organised by the GPs, but it appears that their request was met with some resistance.

I think there is very little. When I talk to some of the health-workers and nurses, they were saying we would love some training. (A14)

That is what I’ve been planning to address when I do these health-worker education sessions. There is also a little bit of resistance from [X] about getting those [training sessions] up and running because having all those doctor sessions are bit of a nuisance, because you have to close the clinic and you have to get people clearance, and now I want to have to do it for the health-workers as well, so we have to find a time when all the health-workers are all together. (A14)

Due to the limited access to regular training initiatives, particularly for non-GP staff, the skills and knowledge among practice staff in effectively managing data and information
to support the care of patients with diabetes appeared to be limited. The practice also had difficulty in gaining access to qualified trainers to teach the staff how to perform these tasks.

*Time and capacity to write reports particularly with some of the health-workers, who have never done that stuff before.* (A11)

I was also told that the orientation and induction program for new staff was disorganised and inconsistent, with some staff receiving little or no induction and others receiving training a few weeks into their appointment.

*The orientation process needs more work on it. What you need is a proper orientation: you need to be shown, walked through it a little bit. I think, eventually after a couple of months, there is all that stuff you just figure out, and, even after that, somebody says, ‘I found this really handy thing that you can do on Medical Director’ and it’s kind of like, well if you had a decent orientation, you wouldn’t have to discover this after four months.* (A14)

The limitations of the orientation and induction program resulted in differences in data and information management practices among staff.

*When I first come here, I was confused by the fact that MD was running and there was a chart coming my way as well. I hadn’t been given any orientation regarding how information was supposed to flow in the organisation. I ended up saying to [X], do you want me to write in the chart and in MD or do you want me to write in MD and print it out, what is supposed to go on here? I think, they just need to have the standard system and they need to inform people of what the standard system is. And then they went paperless.* (A13)

**Part B – The Care of Patients with Diabetes - Overview**

Here I describe the processes for the care of patients with diabetes, including the multidisciplinary team approach, clinical guidelines, the disease register, follow-up and review process, baseline reporting activities and factors relating to the patients.
The Multidisciplinary Team Approach

The multidisciplinary team involved in the clinical management of a patient with diabetes included administrative and clinical ACCHS staff\textsuperscript{21}, visiting allied health practitioner\textsuperscript{22}, and external specialists\textsuperscript{23} from the public and private health sectors.

In the general clinic, two teams were responsible for the management of a patient with diabetes: the chronic disease team (CIP team) and the general clinic team. The chronic disease team, of one GP and two health-workers, coordinated the chronic disease clinic, which provided longer consultation times and was held twice weekly. On other days, patients were opportunistically treated by the general clinic team of GPs, registered and enrolled nurses and health-workers.

The process of care of patients with diabetes in the general clinic commenced when a patient sought a consultation with a GP. The patient was initially seen by an Aboriginal health-worker or nurse and then referred on to the GP. This initial screening included a review of the patient’s history, including that of the presenting illness, family history and past medical history, a physical assessment and undertaking blood and urine tests\textsuperscript{104}. The screening activities depended on the skills and qualifications of the clinician.

The consultation with the GP involved a review of the patient’s medical notes, history taking, physical examination, and undertaking blood and urine tests or measurements. The consultation might also have included the prescription of medications, requests for further tests, referrals for specialist review and activating the electronic recall and reminder function for future appointments.

Referrals were made to multidisciplinary team members based in other ACCHS branches, such as the social health program, and to clinicians and specialists in the public and private health sectors, such as the Queensland Health Diabetes Centre, the

\textsuperscript{21} Administrative staff includes the reception team. Clinical staff includes the Aboriginal health workers, registered nurses, dietician, and GPs.

\textsuperscript{22} Visiting allied health practitioner includes the physiotherapist.

\textsuperscript{23} External specialists include the ophthalmologist, endocrinologist, diabetes educator and podiatrist.
public hospital and private clinics. The Diabetes Centre provided diabetes education, podiatry and specialist management.

As shown in Table 1, referrals made to a diabetes specialist within the last 12 months were recorded in 64% of patient medical charts, with most referrals being made to an ophthalmologist (97%) or endocrinologist (37%). The findings do not include referrals made over the phone or by word of mouth.

The whole multidisciplinary team was present in the one place at the one time on few occasions. The ACCHS chronic disease clinic held weekly team meetings involving the GP and the health worker to discuss the care of their patients. On occasions, case conferences were also organised between the ACCHS and other community health services, such as Home Nursing and the community health team. Communication between the multidisciplinary team was also facilitated by e-mail, referral letters, telephone discussion and informal discussion at staff meetings or during breaks. However, regular meetings involving all members of the multidisciplinary team were few.

What happens every Monday from four-thirty to five, [X] and I set our time aside so that we can go through today... [X] explains this is what is happening with this one and we really [need to] keep an eye on this one at the moment cause this is happening as she [GP] may have reduced the medication in some way to help them [the patient]... With that [meeting]...is really helpful, because where I worked before that never happened.(A15)
Table 1. The completeness of diabetes information recorded in 50 diabetes patient medical files from the ACCHS\textsuperscript{24}. (IAP,2006)

<table>
<thead>
<tr>
<th>Diabetes items</th>
<th>Completeness of records</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographic details and Medicare numbers</td>
<td>100% - however, unable to determine when the information was last updated as no date field was attached to the entry</td>
</tr>
<tr>
<td>Smoking status; Exercise level; Alcohol status</td>
<td>Risk factor information mostly missing – unable to determine when the information was last updated as no date field was attached to the entry</td>
</tr>
<tr>
<td>Medical summary sheet present</td>
<td>100%</td>
</tr>
<tr>
<td>Management plan present</td>
<td>38%</td>
</tr>
<tr>
<td>Clinical goals and self-care goals recorded</td>
<td>38%</td>
</tr>
<tr>
<td>Recall and reminder letter (diabetes specific) sent</td>
<td>64%</td>
</tr>
<tr>
<td>Referrals25 in the last 12 months and ranking of referrals</td>
<td>64%</td>
</tr>
<tr>
<td></td>
<td>Most - ophthalmologist (97%), endocrinologist (37%)</td>
</tr>
<tr>
<td></td>
<td>Least – diabetes educator (6%), dietician (12%), and podiatrist (12%)</td>
</tr>
<tr>
<td>Height</td>
<td>70%</td>
</tr>
</tbody>
</table>

\textsuperscript{24} The time period over which the completeness of diabetes information was recorded was 2 years. For the ACCHS this was from the 1 November 2003 to 31 October 2005.

\textsuperscript{25} The table describes the proportion of referrals made by the GP to members of the multidisciplinary team (as described by the RACGP), which includes a diabetes educator, a dietician, a podiatrist, an endocrinologist or diabetologist, and ophthalmologist or optometrist. An oral health professional, an exercise professional and specialist counselors were not included in this list. In the ACCHS, referrals were made to multidisciplinary team members based in other ACCHS branches, such as the social health program, and to clinicians and specialists in the public and private health sectors, such as the Queensland Health Diabetes Centre, the public hospital and private clinics.
<table>
<thead>
<tr>
<th>Diabetes items</th>
<th>Completeness of records</th>
</tr>
</thead>
<tbody>
<tr>
<td>BP – all tests completed</td>
<td>32%</td>
</tr>
<tr>
<td>BP – average prop of tests per qrt (%)</td>
<td>75%</td>
</tr>
<tr>
<td>HbA1c – all tests completed</td>
<td>54%</td>
</tr>
<tr>
<td>HbA1c – average prop of tests per qrt (%)</td>
<td>72%</td>
</tr>
<tr>
<td>Weight – all tests completed</td>
<td>58%</td>
</tr>
<tr>
<td>Weight – average prop of tests per qrt (%)</td>
<td>71%</td>
</tr>
<tr>
<td>Waist – all tests completed</td>
<td>0</td>
</tr>
<tr>
<td>Waist – av prop of tests per qrt (%)</td>
<td>0</td>
</tr>
<tr>
<td>BMI – weight/height2</td>
<td>26%</td>
</tr>
<tr>
<td>Eye</td>
<td>26%</td>
</tr>
<tr>
<td>Foot check</td>
<td>40%</td>
</tr>
</tbody>
</table>
Clinical Guidelines

The ACCHS endorsed the use of Queensland Health’s diabetes clinical guidelines to ensure a consistent approach by the multidisciplinary team.

The development of the clinical guidelines in conjunction with Queensland Health was an attempt to have a consistent approach. When we have enough doctors... we try and get one of their [Queensland Health Diabetes Centre] doctors down there [ACCHS general clinic] regularly to sit in or to do their [Diabetes Centre] diabetic clinic, and just make sure we both are treating people the same way and its all consistent, and they [the patient] are getting the same message from all of us. (A11)

Although the guidelines were available on the desktop of each computer and in hard-copy format in each consulting room, staff awareness and use appeared to be infrequent.

I haven’t had my hands on that [Chronic Disease Guidelines] as yet. I just go by screening and do what I think that is right. I understand why they send the recalls out, but just the guidelines, and just for myself, I still haven’t been given all my details. If I had that [guidelines] I would be doing it. (A15)

Disease Register

The ACCHS used the electronic patient information system to produce disease registers and patient lists. The patient lists were used to identify current patients with diabetes and to implement specific health strategies, such as chart auditing. There appeared to be little use of the registers to monitor the prevalence of diabetes, both within the service’s population and in the community, to assist in planning and evaluation.

The patient list I used for this study’s chart audit contained the names of patients, together with the diagnosis of either type-1, type-2 and gestational diabetes. The list included regularly attending patients, those who had died and some who had not attended for the last two years.

Follow-up and Review

The follow-up and review process involved the development of a General Practitioner Management Plan (GPMP) and the use of the electronic recall and reminder system.

The GPMP was developed in consultation with the patient and was saved in the electronic chart. The plan described the components of clinical care, the clinical and self-care goals and the follow-up and review dates. The GPMP and other charts, such as flow charts and review charts, provided the clinician with a snapshot of current clinical care and minimised the need to thoroughly review the whole chart.
As shown in Table 1, a GPMP was present in 38% of charts, with clinical and self-care goals recorded in each plan. Flow and review charts were absent.

The GPMP was used to organise the electronic recall and reminder prompts. The GP activated the prompts, which were monitored by the Clinic Manager, who delegated the tasks to the appropriate program or clinician and arranged for the recall and reminder letters to be printed and sent to the patients. Once the patient returned to the clinic, the GP was responsible for cancelling the recall and reminder notices and for activating new prompts.

As demonstrated in Table 1, the recall and reminder letters for diabetes-specific reviews were present in 64% percent of charts. This might be an under-estimate because there were a number of recall and reminder letters within the chart which did not state whether or not the purpose of the recall was a diabetes review.

**Baseline Reporting**

To fulfil reporting requirements, baseline reports were submitted to the Board and to senior management at regular intervals from clinics and programs within the general clinic. The reports contained information such as monthly statistics describing the number of patient presentations, episodes of care and reasons for presentation.

Additional baseline reporting was also undertaken for CQI purposes as part of the CIP. This included a chart audit, process mapping and systems assessment. The chart audit was undertaken by the CIP team at 6-monthly intervals and included a review of 138 diabetic patient medical charts [105].

*We are supposed to be doing audits on how much of difference things are being done in the clinic. It’s not something done by the whole clinic. (A14)*

Due to the paucity of data and information management skills among the staff, assistance was obtained from external organisations, such as Queensland Health, to analyse and interpret the data. The CIP chart audit found that smoking was recorded in 14% of charts and that ‘care of patient’ items, such as blood pressure (51%) and weight (44%) were recorded more frequently than height (20%), HbA1c (27%), foot examination (24%), eye examination (16%) and review by an ophthalmologist (14%).

The CIP process mapping exercise involved the development of flow charts which described the individual components of the care of patients with a chronic disease as well as the information activities required to support the process. The maps were used to
assess the strengths and weaknesses of the clinic’s approach to the care of patients with chronic diseases and to identify areas for improvement [106].

**Factors Relating to Patients**

Although the ACCHS process of care of a patient with diabetes also included facilitating self-care by encouraging home glycaemia (blood glucose) monitoring and providing educational resources and equipment, the general clinic was aware of factors relating to the patients which militated against this initiative.

> You try asking the administration at least to get some blood sugar machines for patients to loan. So that was done... These machines are just sitting at home and you give them [patient] the booklets to record their blood sugar and they are not doing it and they come back and sugar is high. When you prescribe insulin they are not using it. I think it's no longer a failure on our part, but on the clients. The patient becomes dependent - unless you recall them they won’t come. If they understand their condition, it is a chronic one, and you need to be seen on a regular basis, they don't - because they believe the doctors will call me if I need a blood test. (A16)

**Part C - Processes and Flows of Information in the Care of Patients with Diabetes**

Here I describe the processes, data and information management guidelines, the service’s past experience, collection, storage, access, analysis, and use of data and information. The information processes\(^{26}\) involved in the care of patients with diabetes within the ACCHS, as demonstrated in Figure 3, involved a team of administrative and clinical staff (represented by orange and yellow boxes), paper information systems (represented by a grey paper icon), and electronic information systems (represented by the grey cylinders).

The administrative and clinical team included the Aboriginal health-workers, nurses and GPs from the general clinic, plus visitors and specialists from external services. The paper-based information system included the paper medical charts. The electronic systems included the IT hardware, such as computers and printers, and the software, such as Prac Soft, Medical Director (MD), word processing applications, electronic mail and the internet.

\(^{26}\) Information processes – includes only formal processes such as referrals or phone calls. I did not assess the informal information processes, such as discussions over morning tea.

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The information flows depicted in Figure 3 represent a small component of the process of care of patients with diabetes. In reality, the process was more extensive and more complex. It involved the adherence to different data and information management protocols by a number of different people and services, using varying modes and formats to send and receive information.

As demonstrated in Figure 3, there were loops in information. For example, the request for a pathology test (as outlined by the blue lines and boxes) was initiated by the GP and sent, together with the specimen (collected by a nurse or health-worker) to the pathology laboratory, where the results were electronically transmitted to the service, downloaded into the patient's chart and then followed up by the requesting GP.

There were occasions, however, when the flow reached a dead end. For example, when information was received by a person or system, but did not go beyond that point, such as into the paper chart. There was also evidence of duplications and gaps in information flow. These are not illustrated in the process map, but involved, for example, a patient’s presenting twice to the ACCHS following a duplicated recall.

This complexity of information processes involved in the care of patients with diabetes is apparent in the characteristics of, and the degree of interaction between, the individual components. These are described in the following sections regarding data and information collection, storage, access, analysis and use.
Figure 3. The information processes involved in the clinical management of a patient with diabetes by clinicians within the ACCHS general clinic. (IAP, 2006)

27 The patient information recall system, Ferret, is not represented in the process map because it was not being used at the time of the IAP data collection.
Data and Information Management Guidelines

The ACCHS data and information management practices were guided by the National Privacy Principles and the ACCHS policy and procedure guidelines [107-109].

Past Experience

In the past, the ACCHSs have used their data and information primarily for administrative purposes, such as fulfilling reporting requirements to funding agencies. This involved the ACCHS’s collecting and submitting information at regular intervals. The agency would analyse and interpret this information for internal purposes. Apart from reductions in core funds to the service, there was usually little feedback, and that little was verbal. This approach limited the development of skills and knowledge among ACCHS staff and created distrust.

As the prevalence of chronic diseases increased, demand for health care services grew, with a resulting increase in health care costs. In the light of these changes, the funding agencies increased their emphasis on improving the quality of health services and patient outcomes and implemented initiatives to support CQI, such as the monitoring of clinical care. These initiatives included the provision of grants to implement electronic patient information systems, implementation of CQI projects, such as CIP, and changes to the model of reporting in order to focus more on clinical outcomes.

The ACCHSs, on becoming involved in these initiatives, were required to fulfil the associated reporting requirements. However, there were difficulties in engaging with the new reporting requirements because few training and professional development opportunities and few changes to the IT systems were associated with these new responsibilities. This resulted in inadequate staff capacity in data and information management and IT use and restricted the capacity of IT to support this process. Few interventions addressed the distrust which had become entrenched within the service.

Staff just work from day to day, there is no forward planning... Generally staff at X don’t like to report, they see and want to act, they don’t want to see lots of paper work. (Informal discussion with Senior Manager)

No-one looks at data for trends or associations. If they do, it’s off their own initiative. (Informal discussion with Senior Manager)
Collection

As shown in Figure 1, data and information about a patient were collected by different administrative and clinical staff at different times using different modes and formats and adhering to different protocols.

The reception team collected administrative information, such as the patient’s name, date of birth, telephone numbers, address details and Medicare and Health Care Card numbers. This was updated in the medical charts on each subsequent visit, both for medical billing and to ensure that correspondence, such as recall and reminder letters, was sent to the correct address.

The screening staff and the GPs also updated the patient’s contact details and collected clinical information, such as the patient’s family and social history, medical history, reason for presentation, details about their current condition and the results of tests. Data and information were also collected from visitors to the ACCHS and from other patients living outside the LGA.

My chart audit addressed the completeness of the information recorded in the medical charts about the care of patients with diabetes. This is presented in Table 1. As demonstrated there, although medical summary sheets were present in all of 50 of the audited charts, information such as family and social history and risk factors was incomplete. A possible reason is illustrated by the following quote:

_Those two fields [family and social history] are always blank because the social aspect, which is a big part, is left out because basically, I don’t think they [ACCHS] have the capacity to comprehensively manage the social issues. But the health-workers don’t add to these fields, for example, ‘lives with daughter’. That would really help us. It’s interesting - after a year, I learnt this patient is the sister of that and you are the nephew of this one. I am seeing like a big family and I don’t know. They all have different names but they are all related. That is very important, but it is overlooked and left out._ (A16)

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28 IAP Chart Audit – Refer to Chapter 8: Analysis of findings
The completeness of care of patients with diabetes information recorded in the charts, as demonstrated in Table 1, shows that measurements such as height (70%), blood pressure (75%\(^29\)), glycosylated haemoglobin (HbA1c – 77%\(^30\)), and weight (71%) were regularly recorded; foot checks (40%), BMI (26%), and eye checks (26%) were least likely to be recorded. Waist circumference measurements were absent.

The absence of waist circumference measurements appeared to be due to a clinician’s perception that recording of that information was not going to influence their care of patients with diabetes.

_The whole thing about diabetes and belly fat and stuff is important ... waist circumference is not going to suddenly make me do something different from what I have already been doing, it’s sort of one of those things you have been told to do, but doesn’t add that much to what you are doing._ (A14)

_For me, when the patient comes in and she/he is already is obese, as for me the waist would be big. For the process of record, it is incomplete, but as for management, you know the patient needs to lose weight._ (A16)

There were also differences in how and where information was recorded. In my chart audit, I found that information relating to the care of patients with diabetes was recorded using different terms (eg, Type II, Type 2, NIDDM, ‘diab’, diabetes type II) and in various sections of the electronic medical file.

_Sometimes you get the patient and you don’t know them and the difficulty comes in when not all the information is in MD [Medical Director]._ (A16)

_In MD, different people will enter it [name] in different ways, so you will have five different Dr Archers – Dr A Archer, Dr Archer A, Archer A Dr, all separate things and it gets a bit messy._ (A11)

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\(^{29}\) The diabetes clinical guideline used for the IAP chart audit recommends that a patient’s blood pressure be reviewed every three months. The finding represents the average proportion of blood pressure tests recorded per quarter of a 12-month period.

\(^{30}\) The diabetes clinical guideline used for the IAP chart audit recommends that a patient’s glycosylated haemoglobin be reviewed every 6 months.
As previously mentioned, the quality of the disease register was also unsatisfactory, as it contained the names of patients categorised as having different types of diabetes, patients who had died and some who had not been to the service within the last two years.

*It would be helpful if we know which patient is diabetic... A register of all the diabetics are on your computer mixed with visitors, deceased, people who haven’t been here for a year. (A16)*

The incomplete records created gaps and duplications in clinical management and resulted in an increase in staff workload.

*When the patient comes in, I ask them to come back on Thursday for the results. You will mark in the pathology, ‘discuss the result’ or ‘recall urgently’ for bad results. The patient will come in on a Thursday for instance, and when he goes home, he gets a letter from [the Clinic] telling them to come back for the results. (A16)*

As previously mentioned, data and information management guidelines were present. It appears, however, that these quality problems arose because of the infrequent use of these guidelines by staff when collecting data and information.

**Storage**

As previously mentioned, data and information were stored in both a paper chart and an electronic file. The paper chart was considered to be the official medico-legal record and was stored in Compactus units in the reception office. The electronic file was stored in MD.

In 2005, because of the lack of storage facilities, misplaced paper charts and time spent duplicating data entries, the General Clinic switched to a paperless recording system. Data and information were entered into the electronic files and saved, and then backed-up daily. Paper documents, such as letters, medical notes and charts received from other services, were scanned into the electronic medical file on a regular basis.

*We don’t have a very large records room and the volume of physical files and charts was growing daily. Even our archive room was chockablock, so we had to move our files over to the storeroom at social health. (A12)*

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31 The assessment of the security measures for the network, Internet and servers was beyond the scope of my project.
I mean we used a chart and then you’d either put your notes in MD and print out, or put ‘see MD’ in the charts to show in the paper you had actually done that. (A11)

Additional safeguard measures were introduced to protect the databases in case of power failures or computer system failures.

I put the first visitation (sic) of the nurse and the doctor into that file. [If] there is no electricity at least we have a paper record to start... If there is a crash. For any really urgent or important referrals for upcoming operations, I always keep that paper record handy. I don’t necessarily put it in the chart - I put it into ‘the things to do’ tray and I just monitor that. We are trying to go paperless here, and if we do have a crash, we are not going to lose everything. (A12)

Access

Access to the medical charts was restricted to ACCHS employees and authorised personnel. The medical charts were opened to update contact details, to store correspondence, to follow up and review a patient’s clinical management and to record relevant data and information pertaining to the patient’s clinical management.

As demonstrated in Figure 1, when a patient presented at the general clinic, the reception team accessed the electronic file to check the patient’s registration details and to reserve an appointment. The electronic file was re-opened during the consultation with the screening staff or GP to follow-up and review the patient’s clinical care and to record relevant information, such as observations and test results.

Access to the electronic files was protected by security measures, such as usernames, passwords and internet firewalls. Restrictions were also placed on the level of access within the file. For example, while GP’s were allowed access to the entire file, certain staff were excluded from progress notes and pathology results.

Safeguards were also implemented to monitor who gained access to the files and to ensure that two users did not gain access to the same file at the same time. Although access to the paper charts was monitored by the receptionists, once the charts left the Compactus, there were minimal measures in place to monitor access and to prevent access to the information by unauthorised personnel.

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32 An assessment of the security measures for the network, Internet and servers was beyond the scope of my project.
Patients could gain access to information in their medical records. Other health services could, with the approval of the patient and of the ACCHS (to ensure adherence to the NPP and the ACCHS’s policy and procedure guidelines) have access to that patient’s information.

We have two types of forms, a consent form a patient can sign and have on record, which they can withdraw at any time. What that then allows us to do is that, if the patient isn’t here to sign, then we have that previous consent form signed, so if the doctor has some kind of result that is urgent, perhaps this patient does not live locally, then we can actually send that information. (A12)

The safeguards and legislation protecting the data and information collections, such as the National Privacy Principles, were communicated to all staff via staff meetings and electronic mail. There appeared to be a general understanding of the importance of data and information protection.

No problem with communication. Used to be a problem with staff discussing patients in the corridors, but we had a meeting about confidentiality and now don’t do it much. (Informal discussion with clinician from the General Clinic)

One of the major things we are concerned about here is patient privacy. You don’t discuss the patient outside of the workplace, not even at the front desk or anything like that. We are very concerned about patient’s privacy. (A12)

**Analysis**

The electronic patient information system, MD, was not equipped with a reporting function which could support the calculation of percentages or provide comparisons of data. Some of the staff were able to perform simple analytical functions, such as calculating the frequency of visits, episodes of care and waiting times. Complex analyses, for example, of chart audit data, were undertaken by non-ACCHS staff.

**Use**

The general clinic used the data and information collections for administrative and clinical purposes. Administrative purposes included the billing of patients, business administration, and fulfilling the reporting requirements to the Board, senior management and funding organisations. Clinical purposes included supporting clinical care, assisting decision-making, and coordinating a patient’s care within, and external to, the ACCHS.
Data and information were also used for research. The use of data and information for monitoring performance was emerging with the implementation of CQI initiatives such as the CIP.

**Discussion**

The findings from this case study demonstrate that the ACCHS had adopted evidence-based processes in the care of patients with diabetes. A multidisciplinary team-based approach to clinical management was facilitated by referrals and informal communication flows. Registers were used to identify patients with diabetes and to support the implementation of specific health strategies. Systems were in place to ensure that patients were regularly reviewed; this was facilitated by the GPMP and the electronic recall and reminder system. Patient self-care was supported through home blood sugar testing and the provision of education resources and equipment. The ACCHS had also commenced using their data and information to monitor the performance of their care systems for CQI purposes.

The ACCHS’s management of data and information, as depicted in the process map, was complex. Data and information were collected by several administrative and clinical staff. They were stored in two patient information systems and safeguarded with several measures. Data analysis was undertaken by a select group of ACCHS staff with assistance from external professionals. The ACCHS used the data and information to support its administrative and clinical services. Stimulated by external bodies, the ACCHS had commenced using their data and information collections for CQI purposes.

The effective management of data and information within the ACCHS was militated against by the:

- use of two patient information systems;
- inadequate reference to data and information guidelines;
- a paucity of staff capacity in data and information management and IT use; and
- poor quality collection of data (incomplete records, use of different terms to describe the same datum).

These inadequacies could be ascribed to several service factors, including the ACCHS’s funding arrangements, its past experience, organisational structure, decision-making processes, IT system, and staff capacity and capability.
The funding arrangement with OATSIH directly influenced the way the ACCHS managed data and information. As part of their contractual funding arrangement, the ACCHS had, for many years, submitted data and information to OATSIH. OATSIH, via its grants, had determined which programs were implemented, such as the electronic patient information system and the CIP. OATSIH also determined the reporting requirements attached to these grants and to other funds, requiring the ACCHS to submit regular reports based on a set of pre-determined indicators. In the light of these external drivers, the ACCHS implemented two electronic patient information systems, re-orientated their service based on the chronic disease model of care, and engaged in CQI activities to monitor the performance of their systems of clinical care and their patient outcomes. The effective management of data and information to support the application of these new initiatives proved to be inadequate because the ACCHS’s internal systems and processes were not adapted to accommodate these changes. These internal service factors underlying this failure included the ACCHS’s organisational structure, decision-making processes, IT system and staff capacity and capability.

The ACCHS’s implementation of an IT system allowed the service’s management and staff to use electronic messaging to communicate directly with one another. However, the service’s decision-making process continued to follow the lines of authority based on the organisational structure: from operational staff to line manager to senior management team to Executive Officer and finally to the Board. As the ACCHS has grown, over the years, with branches and managerial layers added to its structure, this decision-making process has restricted the timely flow of information within the service. It appears that the decision-making process also failed to harness the benefits of the IT system, such as increased access of staff to managers, increased speed of communication flows and increased capacity to network with other services.

Although the IT system offered a number of benefits to improve the ACCHS’s capacity to manage data and information, it appears that the design, application and investment in the system limited its functionality and use. The ACCHS’s IT system was unable to network with other operating systems, which limited electronic sharing with other health services. The costs for system upgrades, maintenance, technical support, and staff training and development were high. Although these costs were recurrent, the ACCHS’s level of investment in IT system appears not to have planned for them. There also appeared to be little monitoring and evaluation of the IT system to ensure that it
effectively supported the activities of the service. Contributing to these difficulties internally were the inadequate capacity and capability of staff.

As highlighted in the case study, some training was provided to staff. It appears that the training and professional development, particularly for non-GP staff, was inadequate and isolated to the ACCHS operating system rather than to broader topics regarding data and information management and IT use. The absence of adequate and appropriate training and development opportunities limited the capacity of management and staff in:

- developing an information policy and strategy regarding the management of data and information to support clinical care;
- implementing and applying guidelines to improve the quality of collection of data and information;
- effectively managing data and information, particularly performing complex analyses to support CQI activities; and
- effectively using the IT systems and the software applications.

*The information strategy is incorporated into the organisation's strategic plan and in individual business plans. There is some direction regarding the collection of data, dissemination - however, although this is written down, it doesn’t happen as it should. (Informal discussion with senior manager)*

The findings from this case study clearly demonstrate the need for resources to facilitate the ACCHS’s effective management of data and information and IT system to support the care of patients with diabetes. These resources must support the ACCHS in addressing factors such as organisational change and development, effective application of their IT system, workforce training and professional development and access to expert advice.

In my concluding chapter, I draw together my findings from this and the other three case studies to discuss the potential implications for primary health care policy and practice.
Chapter 5: A Community Health Service

As in the previous chapter, this second case study is divided into four parts. Part A provides contextual information about the service. Part B describes the process of care of patients with diabetes. Part C describes the processes and flows of information in the care of patients with diabetes. Part D, the discussion, summarises the main findings. It also describes the service factors which have affected the management of data and information to support the care of patients with diabetes. The IAP project commenced at this Service in March 2006 and feedback was completed by November.

Chapter 8 contains my conclusions from the study as a whole, together with possible implications for PHC policy and practice.

Part A – Contextual Information

Following the presentation of contextual information about the CHS’s social and geographical characteristics is a description of the service, including the catchment population and services, funding, structure, decision-making processes, information systems, quality improvement initiatives, and training and professional development activities.

Social and Geographical Context

The CHS is a state-government-funded health care service based in a rural area (RRMA 5) in north Queensland, approximately 60 kilometres, or 45 minutes drive, from the nearest large rural centre. The community, originally inhabited by local Aboriginal tribes, was colonized in 1892 and became an Anglican Church mission. In 1955, the settlement was transferred to the state government’s jurisdiction. Later, the deeds were transferred to the traditional owners [110].

The community services included the CHS, an Aboriginal community-controlled health service (ACCHS), the local community council, the Queensland ambulance service (QAS), a police station, a preschool, a primary and a secondary school, a library, a bakery and general store, a museum, an aged care facility and government services such as Centrelink.

33 A RRMA 5 is classified as ‘other rural areas with a population of less than 10,000 people’.
34 Large rural centre, as classified according to RRMA, is defined as a centre with a population between 25,000 and 99,000.
The CHS was situated in the main township in close proximity to the private GP clinic, the ACCHS and the QAS. Local residents travelled by public or private transport to utilise services in the nearby rural centre which were not available within the community, such as pharmacies and public hospitals. The QAS and the ACCHS provided transport for patients to attend health-related appointments in the nearby rural centre. The CHS also provided local transport for patients to attend the GP clinic and the CHS.

According to the 2001 Census, the population of the community was a little over 2,000, of whom 94% were of Aboriginal and/or Torres Strait Islander descent, with 62% aged 15 and over, and 3% 65 years and over [111]. The highest level of schooling completed by persons aged 15 and over was Year 10 or equivalent (36%). Within the 15 years and over group, 68% were employed, with most working in government, administration or defence departments (89%). The unemployment rate was 4%. The average number of people living in a household was seven and the median weekly household income was between $700 and $799.

**The Catchment Population and Services**

Previously, the health care services within the local community had included a hospital, the CHS programs and the ACCHS. In the late 1990s, the hospital was closed, with some of the CHS programs being moved into the hospital building.

*It’s been 5 or 6 years since this site has been a hospital. We need a new building because the mindset is that it is still a hospital... It’s learning about the differences, about running programs and not accident and emergency acute stuff.* (C11)

In 2004, the prevalence of chronic diseases within the community’s adult population was approximately 30%, of whom a third were diabetic [112].

*We’ve still got chronic disease, a lot of people with cardiac problems, renal failure, early deaths...We have the same problems we had in the 1980s with alcohol and drugs. Access (to health services) is still the major issue. Most people don’t have a lot of money.* [113]

In an attempt to prevent and effectively manage the increasing prevalence of chronic diseases, Queensland Health implemented the Enhanced Model of Primary Health Care

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35 The percentages do not include children in the counts i.e children aged 15 years and under.
There appeared to have been some resistance among CHS staff towards the change, including concern regarding the adequate resourcing of the strategy.

*The hospital staff have been here all along and the community health staff came up here. We have had a few leave because they didn’t like the primary health care model.* (C11)

*Chronic disease strategy is part of your business you have no choice. We have already complained for the last 2 years that the implementation of the chronic disease strategy has not been researched adequately... There is the GAA (Growth Assessment and Action) screening 0-5, then there are now the 5 – 15 years and then the adult health check, and what is coming, the older aged 65 plus. There are all these other things. We need more resources.* (C11)

The services provided by the CHS included primary clinical care, such as a 24-hour accident and emergency service, general practice, drug administration and supply, immunisation, wound care and blood testing, primary health care programs, care of patients with chronic diseases, clinics run by visiting specialists, and programs such as mental health, aged care, paediatrics, diabetes, obstetrics and gynaecology [112]. The CHS co-operated with other Queensland Health departments, the GP clinic and non-government organisations to provide these services.

**Funding**

The CHS is funded by the state government *via* Queensland Health. The service is allocated an operational budget, but requires approval from the district office to purchase resources, such as computer hardware [18].

**Structure**

Queensland Health has been described as a “bureaucratic, mechanistic structure characterised by centralised formal authority and hierarchical layers of decision making” [18].

*The current structure can work well, but it’s all based on personalities. If you skip a level, certain personalities don’t like that.* (C11)

As shown in Figure 4, the organisation was governed by several levels of management. Queensland Health reported to the state Minister for Health *via* the Director-General and a team consisting of executive officers and general managers.
Queensland Health was divided into several branches, three of them representing the state’s three distinct health zones (Area Health Services): northern, central, and southern (represented in Figure 4 by the pink boxes).
Figure 4. Queensland Health Organisational Structure [114]
The CHS, classified according to its geographical region, sits within the Northern Area Health Service District, governed by a District Manager. The CHS senior management team consists of a director of nursing (DON), a medical superintendent and a senior Aboriginal health-worker. The operational staff included registered and enrolled nurses, Aboriginal health-workers, administrative staff and domestic staff.

**Decision-making**

A key problem with the structure relates to bottlenecks in decision-making particularly as the position of Senior Executive Director of Health Services is responsible for more than 80 percent of the department’s resources. This slowed down the flow of information and the capacity of the organisation to implement new policy or respond to service delivery pressures [18].

The decision-making process appeared to follow the lines of authority, with requests forwarded from operational staff through several layers of line managers. Sometimes, depending on the subject, the requests were forward to a different branch, such as business support or workforce, to obtain endorsement.

The feedback of information within the CHS involved face-to-face discussions between a manager and staff member or group discussions at daily staff meetings. The feedback from senior managers or district office was usually passed down through the appropriate line managers to the DON.

The decision-making process appeared to be time-consuming, particularly if senior management positions were vacant or line managers were on leave.

**Information Systems**

**Internal Use**

**Implementation:**

A branch within Queensland Health, the Information Directorate (ID), was primarily responsible for the development and support of all IT systems and information management activities. The ID services were provided by two entities: a central IT group, responsible for enterprise-wide infrastructure and systems[^36], and local IT units

[^36]: Enterprise-wide systems include the IT and IM applications, infrastructure and networks used by the whole of Queensland Health.
based in individual health service districts, supported local IT infrastructure and local systems. The ID employed 984 full-time equivalent staff, of whom 23 were based in the CHS’s health region, but none were based at the CHS.

The ID planned and developed most of the IT and IM initiatives, particularly applications which were used enterprise-wide, with apparently minimal involvement from CH services.

We just got told one day that it [Ferret] was coming and to get trained and do it. (C13)

The patient information systems used within the CHS included paper-based and electronic information systems. The paper-based system included the paper charts. The electronic systems included several applications, one of which was the Ferret patient information recall system [18].

Application:

Ferret was introduced, on a trial basis, by the Better Health Outcomes Project (BHOP) team, into CHSs in rural and remote indigenous communities. It was implemented to:

- support the EMPHC,
- plan patient care using electronic recall and reminder prompts,
- allow sharing of relevant health information with other Queensland Health facilities, and
- produce reports on the health status of the communities.

Ferret was configured to ‘best practice’ health protocols for the care of patients with chronic diseases and for well-person health care [115].

On-site Ferret training was provided to all CHS staff. A select group received advanced training to become Ferret ‘super users’, responsible for providing advice and support and to train new users.

Prior to the implementation of Ferret, the paper chart was the primary record, used by all administrative and clinical staff and by visiting specialists. The charts were stored in a Compactus storage unit in the reception office and were monitored and maintained by the administrative staff in accordance with Queensland Health’s guidelines and the National Privacy Principles.

Ferret’s patient information recall system was used secondarily to the paper chart. According to the BHOP responsible for the system’s implementation, Ferret was not a
complete record, and so did not replace a patient’s medical chart [116]. Ferret was supported by the BHOP team and Queensland Health’s IT help desk. The IT help desk was the initial point of contact for most Queensland Health employees. Additional support was provided by the local IT unit.

Basic IT problems were managed over the intranet or phone. Complex problems were attended to when a technician was available to visit the community, within days or weeks of reporting the fault.

*Unless if there’s a fault or something, then we actually email or ring 1800 number and say, look we recognise that there’s a fault in here. We give the access number and then they look at it at that end. If they can fix it then that’s fine, it not they will come, bring someone. So it’s only on request. I think that it is actually time consuming and sometimes can be frustrating.* (C13)

The investment in IT systems was determined by the CHS’s district health office. Although the introduction of Ferret increased the CHS’s capacity to manage data and information, additional IT resources, such as computers, were needed. As highlighted in the Forster Review,

*When new systems are rolled out they [Queensland Health] do not consider the needs for desktop access. This is left for districts to budget. This can lead to systems not being implemented or used effectively because districts do not have the budget flexibility to increase the number of desktop devices. This is counterintuitive after spending significant funds in developing an enterprise wide application.* [18]

At the time of my data collection, approximately 23 clinicians plus administrative staff shared 10 computers within the CHS. I was advised that requests had been made to the district health office to obtain additional ICT hardware.

*We need more computers, but it doesn’t get signed off on.* (C11)

*When Ferret was implemented, we didn’t have extra resources for the staff to actually do it properly.* (C12)

*The paucity of computers restricted access to the electronic system, resulting in an increasing backlog of data entry from the paper chart into the electronic file, resulting in the transfer either being forgotten or being attended to later.*

*So Ferret is just entered as time permits. And that is how it is. And at the end of the day, if you don’t have time to enter Ferret, Ferret gets missed.* (C13)
The limited investment in ITs also affected the upgrade and maintenance of the system, the application of new software and technical modifications to allow system linkages with external providers and other electronic information systems, such as the Queensland Health Pathology and Scientific Services (QHPSS) Laboratory Information System (AUSLAB).

*The computer systems are slow, not user friendly, time-consuming and not accurate... But at the best, they will fix the situation, but the big issues are still left standing.* (C13)

It appears that, as highlighted in the Forster Review, the investment and effective application of IT were problems throughout Queensland Health,

*Access to desktop computer facilities (desktop computers, laptops and printers) is a concern in most districts. Clinical staff reported issues with gaining access to a computer to undertake their duties. Examples include doctors not being unable to access a computer on a weekend because the only workstation is locked by a user who has not logged out and staff needing to book computer time in advance to get access to the Internet for research purposes [18].*

Access to timely technical support also affected the CHS’s use of the electronic patient information system, because maintenance and technical support were provided by different sections within the Department, based on whether the system was classified as enterprise-wide or local. The Information Directorate supported the enterprise-wide systems, while the local IT units were responsible for the development and maintenance of local applications.

IT support was accessed by a help-desk structure described as being unresponsive to the needs of the districts and not providing a high level of service. The Forster Review also found that the service delivery and support provided by the information units was variable and that there was a need to improve consistency in service delivery.

The extent of informal information systems and networks within the CHS was beyond the scope of my project.
External Use

_Ferret_ was networked with other Queensland Health facilities to allow authorised staff to have access to information about a patient [116]. However, due to the NPP and technical differences, _Ferret_ was not linked to systems used in external services such as the GP clinic [32].

_Our doctor doesn’t use Ferret, so you don’t get an accurate picture...For example, if the doctor does 50 adult health checks, we don’t get that information because the systems are not linked. You explain this and you pass it up the line, but you don’t get anywhere._ (CI1)

There also appeared to be difficulties linking _Ferret_ to some internal systems, such as the pathology system (AUSLAB), so that pathology results were not electronically downloaded into the patient’s electronic medical file.

The extent of the informal information systems and networks external to the general clinic was beyond the scope of my project.

**Quality Improvement Initiatives**

The Enhanced Model of Primary Health Care (EMPHC) was one of several CQI activities in place in the CHS. This model included working with the community to identify and plan health services, implementing programs to prevent and manage chronic disease and acute care services, recruiting and training staff, using evidence-based treatment protocols and standards of care and using the electronic health system to monitor both the performance of the health service and patient outcomes.

Other CQI activities associated with the EMPHC were annual chart audits and regular planning days involving senior managers from the district office and CHS management and staff.

**Training and Professional Development**

The training and professional development of CHS staff included an orientation and induction program for new employees, formal training activities provided by Queensland Health’s workforce unit, and informal training sessions.

The orientation and induction program was offered to all new staff. The program involved a tour of the CHS and the local community, which was conducted by the DON and the Aboriginal health-workers. New staff were also provided with information about the CHS and Queensland Health [117]. This included an overview of
organisational structure, key policy and procedure documents, administrative and clinical policy and procedures and activities relevant to the CHS.

Professional development activities were organised and provided by the workforce unit. These workshops and courses were provided in the nearby rural centre. Participation by CHS’s employees depended on in-service leave entitlements and approval from senior management.

Informal in-service training activities were provided on-site by visiting clinicians, such as the diabetes educator, and were held in the afternoons. Although CHS staff were encouraged to attend the informal sessions, participation was voluntary. Information sessions were also provided by visiting senior managers and administrative officers from the Brisbane office and from the district office to advise the CHS about new strategies or changes to existing processes.

Whilst training and professional development opportunities were provided on Ferret, there appeared to be little training in broader data and information management and IT areas. Although formal training opportunities in IT systems were provided by the workforce unit, staff had difficulty in attending these courses due to shortages in workforce, particularly of relief staff. These gaps in training opportunities restricted the development of data and information management skills and knowledge among CHS staff.

Although the CHS had begun to manage their data and information for local health service planning such as group interventions, there appeared to be little capacity within the CHS to perform complex data and information management tasks. These findings were similar to those reported in the Forster Review, which identified vast differences in general IT proficiency, with a select group of clinicians highly skilled in using computers and a significant number of the workforce handicapped by a limited understanding or exposure to information technology. The review also identified:

- inadequate awareness among staff regarding the value of data entry;
- inadequate training on using the systems and inadequate capacity of the systems, together resulting in minimal data entry; and
- non-use of the systems.

According to Forster, these problems were also exacerbated by Queensland Health’s limited internal capacity and/or capability to deliver the required ICT training [18].
Part B – The Care of Patients with Diabetes - Overview

I describe here the process of care of patients with diabetes, including the multidisciplinary team approach, clinical guidelines, the disease register, follow-up and review processes, baseline reporting activities and factors relating to patients.

The Multidisciplinary Team Approach

The multidisciplinary team involved in the clinical management of a patient with diabetes involved administrative and clinical staff\textsuperscript{37} from the CHS, the GP clinic\textsuperscript{38}, other Queensland Health services\textsuperscript{39}, and private clinics in the nearby rural centre.

The CHS team responsible for the care of patients with diabetes ran the chronic disease program. The team comprised three Aboriginal health-workers who worked with the GP clinic to coordinate patient care. The services provided by the chronic disease program included:

- opportunistic screening;
- referrals to the GP clinic;
- home visits;
- coordination of specialists’ outreach clinics;
- organising appointments with specialists
- transport of patients;
- community education classes; and
- patient education and support, such as registering patients with the National Diabetes Support Scheme (NDSS) and administering diabetes-related items, such as glucometer sticks.

The GP clinic was located in premises separate from the CHS. It was run by a GP who was also the medical superintendent of the CHS, with a team consisting of an Aboriginal health-worker and a receptionist. The clinic’s services included acute care and the care of patients with chronic diseases.

\textsuperscript{37} Administrative staff includes the reception team. Clinical staff includes the AHWs and the RNs.

\textsuperscript{38} The GP clinic includes the GP, receptionist and AHW.

\textsuperscript{39} Other Queensland Health services includes the team from the Diabetes Centre: endocrinologist, dietician, podiatrist, AHW
The GP made referrals to the chronic disease program for patients needing home visits or if they needed to be placed on an appointment list for a visiting outreach clinic. As previously mentioned, because the GP’s electronic patient information system was not linked to the CHS, correspondence, such as care plans or referrals, were copied and forwarded to the chronic disease program.

Specialists outreach clinics were held at the CHS to improve patient access to specialist services. The clinics were held on a regular basis and coordinated through the chronic disease program. The visiting specialists and clinicians included a GP, diabetes educator, dietician, a podiatrist from Queensland Health’s Diabetes Centre and specialists from the public hospital and private clinics. As an alternative to attending the clinics, patients travelled by bus or private transport to the rural centre to receive specialist or public hospital services.

As demonstrated in Table 2, my findings from the chart audit shows that referrals made to diabetes specialists in the last 12 months were recorded in 80% percent (40) of patient charts, with most referrals being made to a dietician (85%), endocrinologist (57%), diabetes educator (57%), or podiatrist (57%). The findings do not include referrals made over the phone or by word of mouth.

There were very few occasions when the members of the multidisciplinary team were all present in the once place at the one time. The chronic disease program Aboriginal health-workers kept the GP and specialists informed of a patient’s care via e-mails, telephone calls, informal discussion at staff meetings and letters. It appeared that regular meetings involving all members of the multidisciplinary team were few.

*I haven’t actually really seen...the doctor...talking to the outreach consultant or the registrar. They [GP]...sometimes they go through us... The doctor will come and say, ‘look [the patient’s] blood sugar is very high, this person should be seen by the diabetes outreach team’. (C13)*
<table>
<thead>
<tr>
<th>Diabetes items</th>
<th>Completeness of records</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographic details and Medicare numbers</td>
<td>100% - however, inconsistencies between files eg, 72% of medical files had different address listed; unable to determine when the information was last updated as no date filed was attached to the entry</td>
</tr>
<tr>
<td>Smoking status; Exercise level; Alcohol status</td>
<td>88%; 82%; 84%</td>
</tr>
<tr>
<td>Medical summary sheet present</td>
<td>100% - paper medical files</td>
</tr>
<tr>
<td>Management plan present</td>
<td>Copies from the GP present in 50% of files</td>
</tr>
<tr>
<td>Clinical goals and self-care goals recorded</td>
<td>Letters sent by the GP; no copies of letters sent by the CHS</td>
</tr>
<tr>
<td>Recall and reminder letter (diabetes specific) sent</td>
<td>80%</td>
</tr>
<tr>
<td>Referrals(^{40}) in the last 12 months and ranking of referrals</td>
<td>Most – Dietician (85%), endocrinologist; diabetes educator and podiatrist (57%)</td>
</tr>
<tr>
<td></td>
<td>Least – Ophthalmologist (35%)</td>
</tr>
</tbody>
</table>

\(^{40}\) The time period over which the completeness of diabetes information was recorded was 2 years. For the CHS this was from the 1 March 2004 to 28 February 2006.
<table>
<thead>
<tr>
<th>Diabetes items</th>
<th>Completeness of records</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>88%</td>
</tr>
<tr>
<td>BP – all tests completed</td>
<td>28%</td>
</tr>
<tr>
<td>BP – average prop of tests per qrt (%)</td>
<td>67%</td>
</tr>
<tr>
<td>HbA1c – all tests completed</td>
<td>74%</td>
</tr>
<tr>
<td>HbA1c – average prop of tests per qrt (%)</td>
<td>84%</td>
</tr>
<tr>
<td>Weight – all tests completed</td>
<td>58%</td>
</tr>
<tr>
<td>Weight – average prop of tests per qrt (%)</td>
<td>77%</td>
</tr>
<tr>
<td>Waist – all tests completed</td>
<td>12%</td>
</tr>
<tr>
<td>Waist – average prop of tests per qrt (%)</td>
<td>36%</td>
</tr>
<tr>
<td>BMI – weight/height2</td>
<td>64%</td>
</tr>
<tr>
<td>Eye</td>
<td>46%</td>
</tr>
<tr>
<td>Foot check</td>
<td>54%</td>
</tr>
</tbody>
</table>

The table describes the proportion of referrals made by the GP to members of the multidisciplinary team (as described by the RACGP), which includes a diabetes educator, a dietician, a podiatrist, an endocrinologist or diabetologist, and ophthalmologist or optometrist. An oral health professional, an exercise professional and specialist counselors were not included in this list. In the CHS, referrals were made to visiting multidisciplinary team members and those based in other Queensland Health department or centres, such as the Queensland Health Diabetes Centre and the public hospital and private clinics.
Clinical Guidelines

The CHS endorsed the use of the clinical guidelines developed by Queensland Health and by the Royal Flying Doctor service [118]. The guidelines were nominated by Queensland Health as the principal clinical reference and policy document for Aboriginal health-workers, registered nurses, GPs and other health professionals working in rural and remote Queensland.

The diabetes management guidelines were available both in hard copy and electronically. Copies were present in each of the consulting rooms and the staff room. The electronic version was incorporated into Ferret.

There appeared to be little use of the guidelines in the chronic disease program, where the team referred, instead, to the GPMP. The GPMP had been developed by the GP and were based on the clinical guideline recommendations. The health workers referred to the GPMP to determine their role and responsibility in the patient’s clinical care.

Disease Register

The chronic disease program maintained paper registers for the diabetes outreach clinic and the NDSS. The registers were used to identify patients with diabetes and to implement specific health care strategies, such as community group education classes. There appeared to be some use of the registers for planning and evaluation activities, such as requesting additional specialist outreach clinics.

Although Ferret was able to generate and support electronic patient registers, I was advised that most staff preferred to maintain paper records because of difficulties associated with using Ferret and the fear of losing electronic patient data and information due to the frequent system failures caused by power outages.

It goes for all the registers. Initially we thought, ‘alright, it’s going to be a recall system, all the registers will go on’, but through my experience, most of us are going back to manual register. (C13)

The patient list I used for this chart audit contained the names of patients with different types of diabetes (type-1, type-2 and gestational diabetes), regular clients of the service, patients who had died and some who had not been to the service within the last 24 months.
Follow-up and Review

The follow-up and review process involved using the GPMP and monitoring referrals from the GP clinic.

As previously mentioned, the GPMP had been developed by the GP in consultation with the patient. A copy of the plan was forwarded to the CHS, where it was saved in the paper chart. The plan provided a brief description of current clinical care, outlined the clinical and self-care goals and listed future appointment dates for reviews with individual clinicians in the diabetes team.

The GPMP and other charts, such as flow charts and review charts, provided the clinician with a snapshot of the patient’s current clinical care and minimised the need to thoroughly review their whole medical chart. As shown in Table 2, a copy of the GPMP was present in 50% of CHS medical charts, with clinical goals and self-care goals recorded in each plan. The original GPMPs were retained in the GP’s medical files, which I was unable to access as I did not have the necessary authorization. Flow charts and review charts were present in the paper records but the charts were incomplete and the information not current.

A recall and reminder system was also used to facilitate the follow-up and review process. The recall and reminder prompts were activated by the GP. When a patient did not present for their appointment, the GP sent a referral to the CHS rather than a recall and reminder letter. Although the recall and reminder process was being implemented, I could not assess this in my chart audit because I did not have access to the GP’s medical files.

Baseline Reporting

Baseline reports were submitted at regular intervals to the district health office by the CHS management and staff in order to fulfil their reporting requirements. The reports contained information such as monthly statistics regarding the numbers of patients who had attended and of episodes of care and the patients’ reasons for attending.

The district health office also collected data and information about the CHS from regular chart audits and from Ferret. Their findings were disseminated by the Line Manager to the CHS by email or through senior management meetings.

They [Better Health Outcomes Project] send it [reports] to the line managers and then they [reports] come down the line. We receive an email, for example, ‘Please explain why immunisations went up?’ And we have to respond. (C11)
Factors Relating to Patients

The CHS care of a patient with diabetes also included facilitating patient self-care. This included providing community education classes and NDSS support.

The team responsible for the chronic disease program was aware of the limitations of their role, particularly in regard to compliance factors such as failure to attend appointments or refusal to receive treatment\(^\text{42}\).

I was advised that some patients who presented at the CHS for an acute problem were offered a thorough chronic disease review but refused the assessment because they had already spent a considerable time waiting to see the clinician.

\[ \text{If we called somebody up, you [the patient] present, you needed an adult health check. You’ve only had a partial, let’s finish it, complete it... But we [clinician] can’t do that when there’s congestion out the front or nearly 20 dressings... You’ve just got to get them through. (C12)} \]

Part C - Processes and Flows of Information in the Care of Patients with Diabetes

This part describes the processes and flows of information in the care of patients with diabetes, including a description of the processes, data and information management guidelines, past experiences, collection, storage, access, analysis and use.

The information processes\(^\text{43}\) in the care of patients with diabetes within the CHS, as demonstrated in Figure 5, involved a team of administrative and clinical staff (represented as clear rectangular boxes), paper information systems (represented as a paper icon), and electronic information systems (represented as grey cylinders).

The administrative and clinical team included the receptionist, Aboriginal health-workers and nurses from the general clinic, plus specialists and visiting health care professionals from external services. The paper-based information system consisted of paper-based documents such as the charts. The electronic information systems included

\(^{42}\) The Queensland Health Public Patients’ Charter, Your Rights and Responsibilities, describes the patients’ rights and responsibilities in seeking and obtaining health care. The charter states that a patient has the right to take part in decisions about their health care and the right to give permission before they are treated. The patient also has responsibilities such as being on time for appointments, advising the health service if they wish to cancel and providing as much information to the health provider about their health and if they are being treated by another facility.\(^{119}\) (Queensland Health, Your Rights and Responsibilities - Queensland Health Public Patients Charter, Q. Health, Editor. 2002, Queensland Health: Brisbane, Queensland. p. 16)

\(^{43}\) Information processes – include only formal processes such as referrals or phone calls. The informal information processes, such as discussion over morning tea, were not assessed in my project.
the IT hardware and the software applications, such as *Ferret*, word processing applications, electronic mail and the Internet.

The information flows depicted in Figure 5 represented a small component of the process of care of patients with diabetes. In reality the process was more extensive and more complex. It involved a number of different people and services adhering to different data and information management protocols and using varying modes and formats to send and receive information.

As demonstrated in Figure 5, there were loops in the information flow. For example, in the referral process, where information was sent by the GP to the CHS referral officer and the same information arrived back to the GP in the form of feedback from the CHS accident and emergency team or from the chronic disease program.

There were occasions when the flow of information arrived at a dead end. For example, when information was received by a person or system, but did not go beyond that point, as evident by the number of lines ending at the externally based services. There was also evidence of duplications and gaps in information flow, which, while not clearly illustrated in Figure 5, involved patients presenting at both the GP clinic and at the CHS for the same pathology test.

*We [GP and CHS] can’t talk to each other because he uses Medical Director for his recording and we use Ferret. He usually gives us a printout of who he’s seen for the week or whose bloods he’s done. A lot of the times... they get bloods done down there [at the GP clinic] and then they get bloods up here [at the CHS], because we’re recalling them and they’re coming up red on Ferret... So we’re ending up with people with... pricks all over their veins, which is not good practice. So it does create big problems... That’s [the GP printout] probably been in the last six months, but it hasn’t been sustainable. (CI12)*

This complexity of information processes involved in the care of patients with diabetes is apparent in the characteristics and degree of interaction between the individual components. These are described in the following sections regarding data and information collection, storage, access, analysis and use.
Figure 5. The information processes involved in the clinical management of a patient with diabetes by clinicians in the CHS. (IAP, 2006)
Data and Information Management Guidelines

The CHS data and information management practices were guided by the National Privacy Principles and Queensland Health’s policy and procedure guidelines [120-125]. The policy and procedure documents were accessible to CHS employees via Queensland Health’s intranet site, QHEPS (Queensland Health Electronic Publishing Service), the local shared drive and Queensland Health’s website.

Past Experience

In the past, the CHS had primarily used their data and information for administrative purposes, such as fulfilling their reporting requirements to senior management in the district office. The CHS collected and submitted the data and information at regular intervals to their line managers. Further analyses and interpretation of the data were usually performed by a team external to the CHS. As previously mentioned, the district health office also obtained additional data and information from Ferret.

Although the reporting outcomes were presented back to the CHS, it appeared that the results were often inaccurate and the manner in which the findings were provided was unhelpful. This process limited the development of skills and knowledge among the CHS staff and created feelings of distrust.

And how the information is reported back is negative, for example work not achieved. Need to change how reports are written not from a statistical point of view, but from a point of view of the clinician, to assist them in providing a service. It’s about listening to people doing the work. (CI 1)

As previously illustrated, the implementation of the EMPHC introduced additional CQI activities to improve the quality of health care and patient outcomes. The CHS was also undergoing significant change as the service was in the process of being transferred to the auspices of the local ACCHS.

The CHS had commenced managing their data and information for local purposes and had started to consider the IM and IT needs for the new amalgamated service. However, it appears that access to resources, such as workforce, IT systems and training and professional development opportunities continues to restrict the development of effective data and information management practices within the CHS.

Collection

As shown in Figure 5, data and information were collected from a patient with diabetes by various administrative and clinical staff at different times using varying modes and
formats and adhering to different protocols. The CHS data and information collections were categorised into four broad types of collection: clinical, administrative, human resource management and financial [120]. This study focuses on the clinical information collection, in particular on the data and information collected and recorded in the medical records.

As demonstrated in Figure 5, the data and information were initially recorded in the paper chart and later re-entered into the electronic medical file. The collection included the patient’s name, date of birth, phone numbers, address details and Health Care Card number. During a consultation, clinical information was added regarding the presenting problem and family, social and medical histories.

Whilst the CHS staff recorded data and information in both the paper and electronic medical records, visiting specialists recorded data and information on paper only. As previously mentioned, data and information were also recorded in the GP’s medical file, which was not linked to the CHS’s medical files.

There’s only the clinic staff that use it [Ferret]. What about the outreach? When they’re [the patient] actually reviewed by the doctor, by the foot clinic, if they [the outreach clinician] don’t use it [Ferret] and they [the outreach clinician] don’t like investing time, then it’s [data entry] left to us and we don’t have a chance to do it [data entry]. So the data is not accurate... Ferret is just entered as time permits...And at the end of the day if you don’t have time to enter Ferret, Ferret gets missed. (C13)

The findings from my chart audit, which assessed the completeness of information recorded in the medical files concerning the care of patients with diabetes, are presented in Table 2. As demonstrated, medical summary sheets were present in all paper charts. Risk factor information, such as smoking (88%), alcohol status (82%) and level of exercise (84%) were recorded and appeared to be regularly updated due to the annual screening of patients using the adult health check tool. The patient’s height (88%), HbA1c (74%\(^{44}\)) and BMI (64%) were also present. Blood pressure (28%\(^{45}\)) and waist circumference measurements were the least recorded items (12%\(^{46}\)).

\(^{44}\) Guidelines used for IAP chart audit recommended the review of HbA1c tests every 6 months
\(^{45}\) Guidelines used for IAP chart audit recommended the review of blood pressure every 3 months
\(^{46}\) Guidelines used for IAP chart audit recommended the review of waist measurement every 6 months.
There also appeared to be differences within the medical files in how and where in the files the information was recorded. During this chart audit, I found that information on the care of patients with diabetes was recorded using different terms (eg, Type II, Type 2, NIDDM, diab, diabetes type II) and in various sections of the files. Differences between collections were also demonstrated in the annual CHS chart audit. The CHS findings showed that the paper chart contained 70% more information than the electronic file.47

Although, as previously indicated, data and information management guidelines were present, it appears that there was limited use of these measures within the CHS or by visiting specialists. This might be due to several factors:

- inadequate awareness of the guidelines;
- inadequate understanding of the importance of the guidelines to clinical practice;
- awareness of the guidelines, but insufficient time available to enter data and information into both recording systems;
- inadequate skills and knowledge in data and information management and IT use; and
- lack of access to IT systems.

My findings were similar to those identified in the Forster Review, which described an ‘apparent lack of senior management commitment to the effective management of data and information within the Queensland Health department’ [18]. The review suggested that the process was not well understood or resourced and recommended, ‘the organisation adequately resource and train the workforce in information management, including extracting, analysing and interpreting data for use in decision making.’

_The role of managing information, including extracting, analysing and interpreting data for use in decision making in districts, area health services and Central Office needs to be appropriately resourced and skilled. [18]_

The inadequate managing of data and information to support the care of patients with diabetes also appeared to be due to the poor planning and development involved in supporting this process, as outlined in the Forster Review [18].

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47 Obtained findings from an informal discussion with a Queensland Health staff member involved in the chart auditing process.
The impact of data entry, data analysis and reporting from new systems needs to be understood and planned for in the implementation process, rather than expected to be added to existing workloads. Business cases should identify changes to work patterns and any resource shifts needed to gain the benefits of the new system. The implementation of information systems should be adequately resourced including data entry, analysis and reporting [18].

Storage

The data and information collections were stored in two medical files: a paper chart and an electronic file.

The paper chart, regarded as the medico-legal record, was stored in a Compactus unit in the receptionist’s office. The electronic file was stored in Ferret.

The clinical data and information were initially recorded in the paper chart and later re-entered by CHS staff into the electronic file. The paper chart also stored pathology results and all patient-related correspondence. The electronic file duplicated much of the paper chart, storing selected clinical data and information.

Access

Access to the medical files was restricted to authorised Queensland Health employees. The medical charts were accessed to update contact details, to store correspondence, to follow-up, to review a patient’s clinical care and to record relevant data and information pertaining to that care. The level of access to and within the files was dependent upon whether the file was paper or electronic.

As demonstrated in Figure , when a patient presented at the CHS, the receptionist or clinician initially opened the Ferret file to obtain the patient’s unique record number. This was used to retrieve the paper chart from the Compactus. The paper chart was replaced with a tracer card, which recorded the details of the borrower and the new location of the chart.

The paper chart allowed the user access to all its contents, but access to, and within, the electronic file was protected by security measures, including authorised user names and several passwords. Restrictions were also placed on the level of access within the file.

An assessment of the security measures for the network, internet and services was beyond the scope of my project.

48
For example, some users were permitted access to all of the contents, while others were prohibited from accessing sections such as progress notes and pathology results.

As previously mentioned, the files could also be accessed by authorised staff at other Queensland Health facilities. This enabled them to see relevant health information when a patient presented at another clinic. Patients could gain access to information from their medical records. Other health services could, with the approval of the patient and of the health service (to ensure adherence to the NPP and Queensland Health’s policy and procedure guidelines) have access to that patient’s information.

**Analysis**

The analysis of data and information were performed by a number of people based within and external to the CHS. This often resulted in different outcomes, as different data sources were used to produce the reports and there were different interpretations of the findings.

*Ferret* was equipped with a reporting function and was used by the CHS, particularly by its ‘super-users’, to perform analytical tests in order to fulfil the reporting requirements to senior managers and to undertake some local health service planning. Complex analyses, for example, the analysis of data and information to monitor the performance of the service, were undertaken by staff of Queensland Health, including epidemiologists, based in the district health office.

**Use**

The management of data and information within the CHS has primarily been for administrative purposes, such as fulfilling reporting requirements to the district health office.

*Queensland Health’s successful experience with implementing large information systems has principally focused on administration systems (eg finance and human resource management) rather than on implementing front end clinical support systems.* [18]

In recent years, increased emphasis on delivering safer, more efficient and better quality health care and the implementation of the EMPHC have resulted in data and information being used increasingly for clinical and evaluation purposes. This included supporting clinical care, monitoring the performance of the CHS and of the process of clinical care, and use in local health care planning.
Discussion

The findings from this case study demonstrate that processes involved in the care of patients with diabetes were being developed in the CHS. The multidisciplinary team based approach was facilitated by the Aboriginal health-workers in the chronic disease program, which ensured that members of the team (which also included the GP and visiting Queensland Health specialists) were kept informed of the patients’ clinical care. The Aboriginal health-workers used electronic messaging, letters, telephone calls, referrals and informal discussion to support this communication flow. Registers were used to identify patients eligible for NDSS and patients awaiting specialist outreach appointments. Registers were also used to implement specific health care strategies, such as group education classes. Facilitated by the GPMP and by referrals from the GP clinic, patients were regularly reviewed through the chronic disease program. The chronic disease program also supported patient self-care by providing group education classes and NDSS support. Because the performance of their care systems was regularly monitored by the district health office, the CHS was familiar with the process of baseline monitoring.

The management of data and information within the CHS, as depicted in the process map, was complex. Data and information were collected by administrative and clinical staff. They were stored in two patient information systems (paper and electronic) and protected by safeguarding measures. Although some analysis of the collections was done by the CHS, most of the data analysis was undertaken by Queensland Health staff based in the district health office. The data and information were used to support local administrative and clinical services and used by the district office to monitor the performance of the CHS.

The management of data and information within the CHS was adversely affected by the:

- use of two patient information systems, paper and electronic;
- little use by visiting specialists of the electronic system;
- non-linkage of the electronic system with the GP’s system;
- inadequate use of data and information guidelines;
- collections of poor quality – incomplete records, use of different terms to describe type-2 diabetes; and
- inadequate staff capacity in data and information management and IT use.
These inadequacies were related to several service factors, including the CHS’s funding arrangement, past experiences, organisational structure and decision-making processes, IT systems, and staff capacity and capability.

Queensland Health directly influenced the way the CHS managed its data and information. The department determined the level of funding allocated to its directorates and branches, which was then distributed, via the district health office, to services such as the CHS. The department also determined the strategic direction of the CHS’s services: the policies and procedures to guide practice, and the processes involved in monitoring the performance of programs and services. Queensland Health’s increased emphasis on improving systems of care and patient outcomes resulted in the implementation of the EMPHC, the chronic disease strategy and the IT systems. These initiatives were introduced into the CHS, but the effective management of data and information to support the application of these new initiatives was limited because the CHS’s internal systems and processes were not adapted to accommodate these changes. These internal service factors included the decision-making processes, IT systems and staff capacity and capability.

The implementation of the IT systems into the CHS supported local communication flows between managers and staff as well as communication flows within the broader Health Department. However, the decision-making process continued to follow the lines of authority based on Queensland Health’s organisational structure: from AHW to senior AHW to director of nursing and if required, to the district health office where the process continued to follow the lines of authority. Given the size and complexity of Queensland Health, the decision-making process was slow and time-consuming and failed to harness the benefits of the IT system, some of which included increased access to managers and staff, increased speed of communication flows and increased capacity to network with other Queensland Health services.

The application of the IT system within the CHS was also a problem. There appeared to be minimal investment in the CHS’s IT systems, resulting in the low ratio of computers to workforce. Although the CHS was allocated a budget, it appears that the disbursement of funds was determined by managers external to the service. The limited access to computers by staff resulted in an increased backlog of data entry, compounded by a lack of time and workforce shortages. Given the use of two information systems, the data entry workload was significant. This workload was increased by the failure of visiting practitioners and specialists to use the electronic system. The electronic patient
information system, Ferret, was unable to link with the GPs’ electronic system, Medical Director, or with the pathology system, AUSLAB, so that a paper copy of this information was saved in the paper chart and later entered into the electronic file.

Although support and maintenance of the IT systems was provided by the BHOP team and the local IT units, access to timely technical support appeared to be a problem. This also decreased the effectiveness and efficiency of the system in supporting data and information management. There also appeared to be little monitoring and evaluation of the IT system to ensure that it effectively supported the activities of the service, such as the clinical care of patients. An internal factor contributing to these difficulties was inadequate staff capacity and capability.

As mentioned above, some training in the electronic system was provided to CHS management and staff. A select group of staff were also trained as ‘super users’ of the system. However, there were insufficient ‘super users’ to provide regular training and professional development to new and current staff. The training topics also appeared to be confined to Ferret, rather than being on broader topics regarding data and information management and IT use. The absence of adequate and appropriate training and development opportunities restricted the capacity of management and staff to:

- apply the data and information guidelines to improve the quality of collection;
- effectively manage data and information, particularly to perform complex analyses to support the CHS’s CQI activities; and
- effectively use IT systems and software applications.

My findings clearly demonstrate that the resources allocated by Queensland Health needed to filter through more efficiently to adequately support the CHS’s local structures and systems. These resources were needed to support the CHS in addressing factors such as the change and development of the local service in response to broader departmental initiatives and strategies, effective application of the IT system, workforce recruitment and training and professional development.

My findings from this and the other case studies are drawn together in Chapter 8 where I discuss their potential implications for primary health care policy and practice.
Chapter 6: A Rural General Practice

As with the previous two case studies, this chapter is divided into four parts: contextual information about the service; the process of care of patients with diabetes; the processes and flows of information in the care of patients with diabetes; and a discussion. The final part also identifies the service factors which have affected the management of data and information to support the care of patients with diabetes. The IAP project commenced at this Service in March 2006 and feedback was completed by November.

Chapter 8 contains my conclusions from the study as a whole, together with possible implications for PHC policy and practice.

This chapter presents my study of a private rural general practice.

Part A – Contextual Information

In Part A, contextual information is presented about the practice’s social and geographical characteristics. This is followed by a description of the practice, including the catchment population, services, funding, structure, decision-making process, information systems, quality improvement initiatives, and training and professional development activities.

Social and Geographical Context

The practice was based in a rural town (RRMA 5) in north Queensland. The town, established in the 1800s, is the largest in its shire.

According to the 2001 Census, the total population of people living within the local area was a little over 8,000, of whom 77% were aged 15 and over, and 16% aged 65 and over [126]. People of Aboriginal and/or Torres Strait Islander descent comprised 14%. The highest level of schooling completed by persons aged 15 and over was Year 10 or equivalent (29%). The percentage of people employed within the 15 years and over age group was 49%, with most working in agriculture, forestry and fishing (16%), retail trade (16%) and manufacturing (11%). The unemployment rate was 11%. The average number of people living in a household was 3.5 and the median weekly household income was between $500 and $599.

49 A RRMA 5 is defined as an area with a population of less than 10,000 people.
There were six general practices, an Aboriginal community-controlled health service, and a state-funded community health service in the town. A local branch of Diabetes Australia provided support and education for the self-care of patients with diabetes.

**The Catchment Population and Services**

The practice was established in 2002, following an amalgamation of two smaller practices. The service population included people living in the shire as well as visitors from nearby regions.

Compared with the rest of Queensland, the population had a higher proportion of older people, males and indigenous people, and a culturally diverse population with poor proficiency in English [99]. The major causes of death and illness were coronary heart disease, stroke, chronic obstructive pulmonary disease, depression leading to suicide and lung cancer.

The services provided by the practice included primary clinical care, community nursing, a drug and alcohol program, workplace health assessments, 24-hour blood pressure monitoring, skin cancer screening, diabetes education, podiatry and care for mental illness. The practice planned to provide more services, such as group education classes, but was restricted by the lack of space within the premises to accommodate such programs.

*We have 20 rooms for 4 doctors and we still regard 20 rooms as not being enough space. The need for more room is growing...We are thinking about expanding our staff and the size of the practice, but it's a huge problem. We (Directors) have talked about the future, part of the difficulty is to think about it and do it, and then something new will happen. The actual change is also very expensive. (GPR1)*
**Funding**

The practice received the majority of its income from Medicare rebates, patients’ out-of-pocket fees and direct Medicare payments, such as those available through the Enhanced Primary Care (EPC) program. The practice also received income from other programs, such as the More Allied Health Services (MAHS) program.

All this [EPC item numbers and MAHS] allowed us to earn money for having other people in the practice do other things apart from earning a consultation fee. This has been gradual over the last 5 years. Whereas before when we could only charge a fee if we [GPs] saw somebody, you could have your nurse spend all day looking after somebody and you couldn’t earn a penny from it... If the item numbers didn’t exist, we couldn’t do the health assessment, we couldn’t have somebody out of the practice nearly all day, every day. Our model is dependent on all those changes in the last 5 years. Without them we couldn’t do it. (GPRl)

**Structure**

The practice was established by three GPs who believed that there was no long-term future for smaller practices [127].

Most of us recognised that there was no long-term future in general practice for doctors to be by themselves, and virtually all of the practices in town that were looking at amalgamating were one- or two- doctor practices. (GPRl)

The amalgamation process, supported by a government grant, involved four years of extensive planning and discussions.

The whole exercise of going through the motions of having meetings with all the doctors in town, going through with what we will do and how we would do it, one dropping out, another dropping out, being left with who you want, deciding how to do it, recruiting another doctor, getting him here, finding the premises and doing this, took four years... In the end, left with two practices that said, ‘Yes, we will amalgamate’. Discussion went on for a couple of years. We decided that one doctor joining two doctors wasn’t enough, so we recruited another doctor to be with the sole practitioner, with the view to amalgamating two doctors and two doctors and having four. (GPRI)

The practice was hierarchical in structure, being owned and governed by four GPs, three of whom had been the founders (Figure 6). Of these, one was nominated and remunerated to undertake additional responsibilities similar to those of a practice manager, such as managing the practice’s daily activities, organising staff, monitoring equipment and attending local and state forums. The practice also included a team of
administrative staff, registered nurses, Aboriginal health-workers and it facilitated attendances by visiting clinicians.

Figure 6. Organisational structure of private GP rural practice

![Organisational structure diagram]

**Decision-making**

The four owners, also known as ‘directors’, had equal decision-making power. They met at least once a month to discuss the business aspects of the practice. The managing GP implemented the directors’ decisions. If staff were opposed to a proposed change, they would discuss their opinions and concerns with the managing GP or with the directors. The staff also met at regular times during the year, forwarding the outcomes of their meetings to the GPs.

*Staff get themselves together four times a year for a staff meeting that they run themselves, and they don’t get paid for it. It’s purely voluntary, they all turn up, they have their minutes and they give us (Directors) the minutes. The doctors have no input into the meeting. (GPR3)*

I was advised that, on most occasions, the practice staff reported to the managing GP. When the managing GP was unavailable, urgent or complex requests were reported to the other directors.
Information Systems

Internal Use

Implementation:
The implementation of the IT systems was organised by the managing GP and the external IT consultant.

Prior to the amalgamation, the two practices were partially computerised. These practices retained two paper medical files for each patient: an RACGP file and a file containing short consultation notes. Some of these files contained medical histories covering a 20-year period.

When the practices amalgamated, they purchased new IT hardware and software and merged approximately 12,000 medical files from the two practices into a new Genie database. The paper charts were then archived. The practice created a unique file number for each patient and linked the archived paper charts to the corresponding electronic file. The transition from dual recording to a paperless system is described in the following quote,

_We kept the files separate and well organised, so if we needed the paper based files, we could access them easily and we keep them at reception. For twelve months, we used computer records for billing, appointments, prescriptions and our medical records were gradually building up. So for twelve months we used the paper-based and the computer-based... At the end of 1993, we were ready to use the computer-based records entirely. Now we only get the hard copy notes out if we need them, a few times a week, sometimes we want to look back and access records that might go back five years... About two years ago we went paperless. We have computer-based scanning of referral notes from other people, computer based medical records, billing, appointments, letters and referral writing._ (GPR1)

Application:
The patient information systems were both paper-based and electronic. The paper-based system included the paper charts. Genie was the electronic system. Genie was used by all clinicians and staff.

A computer terminal was available in each of the GPs' consulting rooms and for each receptionist. Additional terminals were available in other rooms. The system was networked to give clinicians and administrative staff access to the files and to the shared drive from their different locations.
Genie increased the capacity of the practice in managing their data and information. However, it did not appear to support internal electronic messaging or recent changes to the processes of clinical care.

The information systems are not evolving as fast as they need to for chronic disease management. All the software programs and the programmers cannot keep up with the changes. Even with the updates, they cannot keep up. General practice and the applications for which the programs are written are so diverse...All the GPs have a slightly different complement of work, all want something different from the program in the software to do what they want to do and they just can’t keep up. (GPR1)

The following quote describes the difficulty in using the system to support clinical care, such as maintaining a list of patients with type-1 and type-2 diabetes,

The difficulty is trying to get the system to do what the book system does. Genie has to print out each month a report of who has had their assessment completed. You can’t pull up a database of all the patients just to see what their status is. (Informal discussion with clinical staff)

It appears that Genie also created more work for the practice.

Having all the information connectivity IT based would make it much easier to talk to each other and save time and energy putting everything into patients’ charts. I am passed thinking and doing everything IT makes life simpler. It never seems to make it simpler; it seems to double all the work that everybody wants out of it. (GPR1)

The IT systems were regularly upgraded and maintained by the managing GP, an external IT consultant based in the regional centre, and the medical software suppliers based in Brisbane.

We have a very tough IT consultant who is very professional and looks after us very well... We have an excellent system and he checks that we do daily backups onto an external hard drive that is taken off-site every day. So we have three back-ups within the surgery onto different computers or our database and we back up onto an external hard drive every day. (GPR2)

The managing GP was responsible for monitoring the IT hardware and software applications, providing basic training and advice to practice staff, reporting system failures, and coordinating the regular maintenance and upgrades of the system with the external consultant and the software suppliers. The consultant provided expert advice and support for the system and the network, which included hardware maintenance and
repairs, and addressing complex troubleshooting problems. The software suppliers provided advice and support regarding their product via the Internet. An online Genie support centre also allowed users to ‘chat’ with one another to resolve problems.

*Genie has a chat function so GPs can chat about problems or solutions to using the system effectively.* (GPR2)

According to the practice’s business plan, approximately 1.2 percent of the practice’s gross income was invested in IT hardware and software [127]. The importance of investing in good quality data and information safeguards and support services was recognised by the practice when the premises were damaged and the IT hardware and software components destroyed.

*We did a special back-up on the Sunday, over and above our normal back-ups of our whole database, which includes our software and our database and the lot. We checked the back-up and we took it off-site to other premises... Our server was under the steps in an area that never gets wet. When we took it up to X, the computer guy said ‘Did this get wet?’ I said ‘No, it did not get wet’. He said there was dust and dirt that got pumped into the guts of it... it’s like a pressure pound wave had driven dust all through it. He said, ‘all your IT is a write off’. In fact, most of it has survived, but it’s all a fire hazard and we expect it to crack up very shortly, so it’s all being replaced. We recovered our database, and in about 6 days, we were set up here. We had the IT consultant and the cabling guy come down and within about 7 or 8 days, we were up and running...* (GPR2)

The extent of informal information systems and networks within the practice was beyond the scope of my project.

**External Use**

Use of the electronic system by health services and providers external to the practice was limited by the National Privacy Principles and by technical differences between operating systems.

The practice shared administrative data and information, such as Medicare billing items, with the Health Insurance Commission. However, Genie was unable to link and share clinical information with other organisations, such as the local hospital. Patient information was usually sent to other health providers such as Queensland Health in hard copy format by post or facsimile.

The extent of the informal information systems and networks external to the practice was beyond the scope of my project.
**Quality Improvement Initiatives**

The practice was an ‘accredited’ practice, aiming to provide the best quality care to patients. It participated in activities organised by the local Division of General Practice, research projects and initiatives offered by Queensland Health and other organisations.

On most occasions, the managing GP, who was also a general practice accредитор, participated in local and rural GP forums, training seminars and conferences and local Divisional meetings. He would provide feedback to the other GP directors regarding new initiatives and changes and was instrumental in determining which activities the practice would engage in.

The practice was aware of the National Quality Performance System (NQPS), the framework for monitoring the performance of the Divisions, but their participation was voluntary.

*Data analysis for clinical outcomes is an incredibly difficult area. The Commonwealth is just starting to ask for all the Divisions to do this. It's very difficult, issues of privacy, de-identified data and basically it's not done. Some Divisions collate data, but most Divisions don't do any. Our Division is looking at some software to do it…but haven't done it.* (GPR2)

There also appeared to be inadequate capacity within the practice to engage in these activities, such as insufficient time and a lack of skilled workforce.

*It's not the practice. We get all these books and magazines that say, 'We have new evidence today, this is how you should do this’. How you apply this in your practice to some extent, we need someone like a nurse, not a doctor because if we [doctors] stop and do all of this, we can't see patients. Need someone like a nurse with knowledge of IT and for the doctor to say, 'We would like you to analyse our data to do this and that'. We don't do that yet, I have never come across anybody that does it.* (GPR1)

**Training and Professional Development**

The training and professional development of the practice's clinicians and staff included an orientation and induction program for new employees, formal training activities provided by the Division and informal training sessions.

New staff participated in an induction program or 'buddy' system. This involved the new employee working alongside a staff member for a time. The staff member introduced the new employee to the practice staff, policies and procedures, roles and responsibilities, and processes.
The GPs participated in regular training and professional development activities supported by the Division. This training was delivered at the practice or in the nearby large rural centre, mostly on weekends.

_The Divisions are there as a supporting and coordinating role. If we desperately need some help, in many cases the divisions can supply, as in staff up-skilling, recruiting locums, supplying allied health people, the doctors CME, it's all organised through the Divisions. There is a lot of support for us, for all the staff, not just the doctors._ (GPR1)

The non-medical and administrative staff also participated in formal and informal training and professional development activities organised by the managing GP or by staff. The in-service training was provided by the managing GP, visiting clinicians or external health providers, covering topics such as the EPC package, GPMP or recent health initiatives, such as a weight loss program. The practice also encouraged and supported staff in participating in formal training courses.

Whilst training and professional development opportunities were provided on Genie, this training was not regular and there appeared to be little training in broader data and information management and IT areas. This appeared to be due to difficulties associated with recruiting qualified trainers to perform these tasks.

_The difficulty with implementing IT is you have to teach 16 people. The difficulty is trying to teach 16 people who have not used the system before. We find getting training, IT training, quite difficult to access. It's a rural problem. These people don't exist. As I go around from practice to practice, I see huge needs for people within the practice to learn MD. Doctors and staff just don't know how to use it and they don't access it._ (GPR1)

**Part B – The Care of Patients with Diabetes - Overview**

Here I describe the process of care of patients with diabetes, including the multidisciplinary team approach, clinical guidelines, disease register, follow-up and review process, baseline reporting activities and factors relating to the patients.

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50 GPR1 is referring to the capacity needs of other GP practices that are using the patient information systems, MD (Medical Director).
The Multidisciplinary Team Approach

All these new Medicare item numbers have changed the whole scene... We now have the opportunity to have this team approach. (GPR1)

The multidisciplinary team involved in the clinical management of a patient with diabetes included the administrative and clinical practice staff, visiting allied health practitioners and specialists from both public and private external health services.

The practice team comprised administrative staff (the receptionists, triage officer, practice administrator and referral officer), clinical staff (the four GPs, registered nurses, Aboriginal health-workers) and visiting allied health practitioners (the diabetes educator, dietician, psychologist and podiatrist).

The process of care of patients with diabetes in the general clinic commenced when a patient seeking a consultation with the GP booked an appointment with the receptionists. Once an appointment was confirmed, the patient was directed to the waiting room. Unlike the ACCHS, patients were not screened prior to their consultation. However, a ‘triage officer’ monitored the flow of patients, maintained the consulting rooms and amenities, and delivered messages to clinicians and staff.

The consultation involved a review of the patient's electronic medical notes, history taking, physical examination and undertaking blood and urine tests or measurements. The consultation might also have involved the prescription of medications, requests for further tests, referrals for specialist review or activating the electronic recall and reminder function for future appointments. The GP was also supported by a registered nurse and an Aboriginal health-worker. The RN or health worker assisted with minor surgical procedures (such as the removal of stitches or skin cancers), performed some tests (such as electrocardiograms), and did health assessments (such as the adult health check). These tasks were rotated daily among staff.

As shown in Table 3, referrals made to a diabetes specialist in the last 12 months were recorded in 54% of medical files, with most referrals being made to a diabetes educator (42%) or an ophthalmologist (48%). These findings do not include referrals made over the phone or by word of mouth.
The GP does the coordination, so they will see the doctor and once they are diagnosed, it is put in their summary notes that they are diabetic. The doctor may then refer them directly to the diabetes educator or the dietician, it’s all on site. We almost never refer anybody to someone outside of this building. (GPR1)

Communication between the practice and members of the multidisciplinary team appeared to be facilitated by the triage officer, referral letters, telephone discussions and informal discussion over morning tea and lunch. There were face-to-face meetings between the GP and the diabetes specialist, but there appeared to be few meetings involving the whole multidisciplinary team.
<table>
<thead>
<tr>
<th>Diabetes Items</th>
<th>Completeness of records</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographic details and Medicare numbers</td>
<td>All information regularly collected and updated</td>
</tr>
</tbody>
</table>
| Smoking status; Exercise level; Alcohol status | Smoking status - 90%  
Exercise level - 34%  
Alcohol status - 48%  
Medical summary sheets present in all patient files on Genie |
| Medical summary sheet present | 16%  
16%  
Phone calls made in lieu of letters – no record in the file re: recall phone calls |
| Management plan present | 54%  
Most – ophthalmologist (48%) and diabetes educator (42%)  
Least – dietician (12%), podiatrist (6%), and endocrinologist (0) |
| Clinical goals and self-care goals recorded | |
| Recall and reminder letter (diabetes specific) sent | |
| Referrals in the last 12 months and ranking of referrals | |

52 The time period over which the completeness of diabetes information was recorded was 2 years. For the GP rural practice this was from the 1 March 2004 to 28 February 2006.

53 The table describes the proportion of referrals made by the GP to members of the multidisciplinary team (as described by the RACGP), which includes a diabetes educator, a dietician, a podiatrist, an endocrinologist or diabetologist, and ophthalmologist or optometrist. An oral health professional, an exercise professional and specialist counselors were not included in this list. In the GP rural practice, referrals were made to visiting multidisciplinary team members and those based in external health department or centres, such as the Queensland Health Diabetes Centre and the public hospital and private clinics.
<table>
<thead>
<tr>
<th>Diabetes Items</th>
<th>Completeness of records</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>84%</td>
</tr>
<tr>
<td>BP – all tests completed</td>
<td>42%</td>
</tr>
<tr>
<td>BP – average prop of tests per quarter (%)</td>
<td>75%</td>
</tr>
<tr>
<td>HbA1c – all tests completed</td>
<td>76%</td>
</tr>
<tr>
<td>HbA1c – average prop of tests per quarter (%)</td>
<td>86%</td>
</tr>
<tr>
<td>Weight – all tests completed</td>
<td>30%</td>
</tr>
<tr>
<td>Weight – average prop of tests per quarter (%)</td>
<td>56%</td>
</tr>
<tr>
<td>Waist – all tests completed</td>
<td>0</td>
</tr>
<tr>
<td>Waist – average prop of tests per quarter (%)</td>
<td>1%</td>
</tr>
<tr>
<td>BMI – weight/height2</td>
<td>75%</td>
</tr>
<tr>
<td>Eye</td>
<td>30%</td>
</tr>
<tr>
<td>Foot check</td>
<td>30%</td>
</tr>
</tbody>
</table>
Clinical Guidelines

The practice endorsed the use of the Diabetes Australia and the RACGP's clinical guidelines. However, in practice, the clinicians referred to the Diabetes Annual Cycle of Care (ACC) recommendations to guide the clinical management of patients with diabetes.

Patients became eligible for a Diabetes ACC review once they had been diagnosed with type-2 diabetes and added to the ACC register. The register was regularly reviewed by an Aboriginal health-worker or RN, who notified the GPs of due or overdue tests.

Once the requirements for the ACC were met, the application had to be endorsed by a GP. This information was then submitted to, and assessed by, the HIC. If approved, the practice received a ‘special incentive payment’ (SIP) [69]. Part of the SIP was paid by the practice to the Aboriginal health-worker or RN who had assisted in completing the review.

The ACC recommendations comprise:

- six-monthly tests, including weight and height (with calculation of the body mass index), and blood pressure, and an examination of the feet;
- annual tests, including glycosylated haemoglobin, total and HDL cholesterol, triglycerides and for microalbuminuria;
- a comprehensive eye examination every two years; and
- other requirements, such as a medication review, encouragement to stop smoking — if relevant, review of diet, and review of levels of physical activity [69].

Disease Register

The practice used a patient register to identify patients eligible for EPC assessments and reviews and to implement specific health strategies, such as a walking program. There appeared to be little use of the register to plan and evaluate health service activities.

Paper registers were produced from electronic patient lists in Genie. An Aboriginal health-worker or RN accessed the medical files of the identified patients to determine who was eligible for an EPC test or review. This information was used to update the paper registers for adult health checks, diabetes ACC review and health assessments.

The patient list I used for this study's chart audit contained the names of patients with diagnoses of type-1, type-2, and gestational diabetes. In addition to the listing of regular
clients of the service, there were some who had died and some who had not been to the service within the previous two years.

**Follow-up and Review**

The follow-up and review process was facilitated by the ACC review. There was also some use of the electronic recall and reminder system and of the GPMP.

The electronic recall and reminder system was activated primarily for pathology tests and was not used for all diabetes tests because there was inadequate capacity to attend to all the recalls.

*Recall not well set up and not everyone is using it much. Use the recall list for abnormal pathology tests, diabetes SIP, pap smears and health assessments. Not following up other recalls. (GPR3)*

*Recall and reminder is available, but we haven't got the capacity to be phoning all the diabetics due for recall and reminder. (GPR1)*

The GPs activated the prompts and were also responsible for de-activating the alerts. This sometimes created extra work for the staff, particularly if the GP forgot to take the patient's name off the recall list.

*Once the patient is phoned for the recall, the system does not automatically alert the clinician that this task has been completed. The problem is the doctor is the only one allowed to take the patient off the list and if we [GPs] are a bit slack, then they [health-workers or RNs] can waste a lot of time going back to check. (GPR3)*

The recall and reminder process adhered to the RACGP’s standards, which involved two follow-up phone calls and then a letter sent by registered mail. In the light of this procedure, as shown in Table 3, I found no recall and reminder letters in the medical files. During feedback on my findings, I was advised that a record of the recall and reminder phone call was made in the progress notes of the medical file.

The follow-up and review process also involved the development of the GPMP. These plans were a recent initiative. There were, therefore few (16%) completed plans in the medical files. (Table 3) There was no evidence of flow or review charts.

**Baseline Reporting**

The baseline reporting activities included activities associated with the requirements for accreditation and some reporting undertaken for the local Division [85].
Factors Relating to Patients

The practice’s care of a patient with diabetes included facilitating patient self-care, such as home blood glucose monitoring, group education classes and 24-hour blood pressure monitoring. The practice was also working with the Division to establish a patient education program, as described in the following quote,

*The patient needs to learn about their disease. The Division is setting up a chronic disease management office in town as part of the Queensland Health Greenway project. We have been asked to have a room there for patient education. The big black in GP is the inability for us to educate our patients on chronic disease self-management. Doing one-on-one is incredibly time-consuming and inefficient. Doing it in small groups is probably better, where people get to listen to each other. In our surgery, we will probably have some very small groups, family groups and educate in the conference room, but not the bigger groups.* (GPR1)

However, the effectiveness of these interventions were limited by patient factors, such as compliance.

*Some people only want to get scripts and not have a full check.* (GPR2)

*Patients haven’t quite got the message that their best care is everyone knows what is happening. Even in a small town like this, you come to me for a pap smear, but you don’t want me to send the information to the other doctor because you don’t want him to know that you came to see me.* (GPR3)

Part C - Processes and Flows of Information in the Care of Patients with Diabetes

This part describes the processes and flows of information in the care of patients with diabetes, including a description of the processes, data and information management guidelines, past experience, collection, storage, access, analysis, and use of data.

The information processes involved in the care of patients with diabetes within the practice, as demonstrated in Figure 7, involved a team of administrative and clinical staff, and paper and electronic information systems.

The information flows depicted in Figure 7 represent a small component of the process of care of patients with diabetes. In reality, the process was more extensive and more complex. It involved a number of different people and services adhering to different data and information management protocols and using various modes and formats to send and receive information.
As demonstrated in Figure 7, there were loops in the information flow, for example, the request for a pathology test, initiated by the GP and sent to the pathology laboratory, where the results were downloaded to the medical files and followed up by the requesting GP. Information loops were also present in the referral process as described in the following quote,

*Usually if we refer we receive something back, there is a loop. If it (correspondence) starts from us, we are usually in the loop. If the episode starts somewhere else, we are often left out.* (GPR2)

There were occasions when the flow of information arrived at a dead end. For example, when information was received by a person or system, but did not go beyond that point. This was evident by the number of lines converging on the electronic system, *Genie*, with few lines leaving the system. Duplications and gaps in information flow were also evident. For example, when the managing GP was unavailable and had not informed the other GPs of a previously arranged meeting.

This complexity of information processes involved in the care of patients with diabetes is apparent in the characteristics and the degree of interaction between the individual components. These are described in the following sections regarding data and information collection, storage, access, analysis and use.
Figure 7. The information processes involved in the clinical management of a patient with diabetes by clinicians within the GP rural service. (IAP, 2006)
Data and Information Management Guidelines

The data and information management practices were influenced by the NPP and the RACGP’s standards [117-120]. The standard operating procedures were available within the practice manual and on the RACGP website.

Past Experience

The practices involved in the amalgamation had used their data and information collections primarily for administrative purposes, such as patient-billing, and for clinical purposes, such as patient record-keeping. As previously mentioned, these practices were partially computerised with an electronic patient information system used in conjunction with two paper medical files.

The practices were familiar with the CQI framework as demonstrated by their adherence to the RACGP’s standards and their involvement in practice accreditation. The practices were also aware of the broader health system changes, but their level of engagement in these emerging activities was dependent on the capacity of their workforce and the quality of their data and information collections.

Once the amalgamated practice was established, it became increasingly involved in a number of new initiatives, such as the MAHS and EPC. Although the managing GP was aware of the increased emphasis for practices to monitor the performance of their clinical care, the practice's engagement in this activity was once again limited due to insufficient staff capacity.

We don't have anybody in the practice yet whose dedicated job is to do this and to bring it back and say how we can act on this. GPs don’t do this. We need to.

(GPR2)

In the light of these limitations, the practice commenced working with their local Division to develop skills in IT use and in data and information management.

Collection

As shown in Figure 7, data and information were collected from a patient with diabetes by various administrative and clinical staff at different times, using various modes and formats.

The practice's reception team collected administrative information, such as the patient's name, date of birth, telephone numbers, address details and Medicare and Health Care Card numbers. This information was collected on each visit to update the medical file to
ensure that correspondence, such as recall and reminder letters was sent to the correct address.

The GP, RNs, Aboriginal health workers, and visiting clinicians collected clinical information, such as the patient's family and social history, medical history, reason for presentation, details about the their current condition and the results of clinical tests, such as blood sugar levels and blood pressure measurements. The practice staff entered this information directly into Genie, but most of the visiting staff retained their own separate medical files. The results of pathology tests were automatically downloaded into the electronic medical file.

My chart audit assessed the completeness of information on the care of patients with diabetes recorded in the medical files (Table 3). As demonstrated, medical summary sheets were present in all of the 50 audited electronic files; however, information such as family and social history and risk factors was incomplete. Height had been recorded in 84% of charts, blood pressure in 75%, glycosylated haemoglobin in 86%, weight in 56% and BMI in 75%. Waist circumference measurement was the least recorded item (1%).

The incomplete records for waist measurement appeared to be due to the late application of recent evidence-based findings and the inability of the software system to record these data.

At the moment we put everybody's height and weight and we can calculate the BMI. The latest information [indicates] BMI is now obsolete and doesn't mean much, and everybody should be doing waist-hip ratios which no-one measures and our software doesn't have the ability to put in. So why should we look at BMI when it's an obsolete concept? This is the issue we have to deal with. (GPR2)

I was advised by the visiting diabetes educator that, since the commencement of the diabetes educator service, there was an observable improvement in the performance of additional tests such as blood lipids and for microalbuminuria. These tests, however, were not included in my chart audit.
There were also differences in how and where information was recorded within the medical file. During this chart audit, I discovered that information on the care of patients with diabetes was recorded using different terms (e.g., Type II, Type 2, NIDDM, diab, diabetes type II) and in various sections of the medical files. The disease registers also listed both currently attending and non-attending patients, with various terms for both types of diabetes.

The quality of the collections limited the extent to which the practice could use their information to monitor the performance of their service and their clinical care. Although the practice recognised the importance of improving their data and information practices, the degree to which the practice engaged in these activities depended on the cost of the exercise versus the benefit to the service in caring for the patients.

*We can extract a lot of data, we haven't actually done it because I don't know whether we would change what we do as a result. Finding the time to do it and finding out what to do with what we find out are other issues.* (GPR1)

**Storage**

The information systems were both paper-based and electronic. The paper-based system included the charts and registers. The electronic system included the IT hardware, such as the computers and printers, and software applications, such as *Genie*, word processing, electronic mail and the internet.

*Genie* was the primary storage site for most of the data and information. Paper documents, such as letters, medical notes and files received from other services were scanned into the electronic file weekly.

**Access**

Access to the medical files was restricted to the directors, employees and authorised visiting clinicians, such as the diabetes educator. The electronic medical files were opened to update contact details, to store correspondence, to follow up and review a patient's clinical care and to record relevant data and information pertaining to that care.

As demonstrated in Figure 5, when a patient presented at the practice, the reception team opened the electronic file to confirm and update registration details and to reserve an appointment with the clinician. The electronic file was re-opened during the consultation by the GP, Aboriginal health worker or RN to follow up and review the patient's care and to record relevant information, such as observations and test results.
Access to and within the electronic files was protected by several security measures, such as usernames, passwords and internet firewalls. Each employee was allocated a user name and password to permit access to the electronic files. Additional safeguards were implemented to restrict their level of access to information. For example, the GPs could gain access to the entire file, while reception staff were restricted from gaining access to certain sections, such as the progress notes and the pathology results. Safeguards were also in place to ensure that two users did not use the same file at the same time.

Patients were permitted access to their files. This process required a written request from the patient and had to adhere to NPP and RACGP standards. According to the RACGP's handbook for the management of health information in private medical practice, the private GP practice could refuse a patient access to their personal health information if:

- providing access would pose a serious threat to the life or health of any individual;
- providing access would have an unreasonable impact on the privacy of other individuals;
- the request for access was frivolous or vexatious; or
- denying access was required or authorised by law [120].

They were also allowed to disclose information for the purpose for which it was collected or for another directly related purpose.

**Analysis**

As previously mentioned, *Genie* was equipped with a reporting function to generate simple reports, such as patient lists. Although the managing GP analysed some of the practice data and information, the more complex tasks required additional support from the local Division.

*Big step is for practices to do their own data analysis within their own practice...There aren't many practices analysing their own data for that sort of thing. We are dabbling in that sort of thing, but still not doing it very well.*

(GPRI)

*Quite a number of us here know how to generate reports. The software is quite easy to use. It's not difficult to learn.* (GPR1)
**Use**

The practice used the data and information collections for administrative and clinical purposes. The administrative purposes included using data and information for patient billing, business management and developing proposals to external organisations [116]. The clinical purposes included supporting clinical management, assisting clinical decision-making, and coordinating patient care within the practice. There also appeared to be some use of de-identified data and information by the local Division.

*I like Genie because, if a drug rep comes in, I can go into the system and show him which drugs the practice mostly uses. We do a lot of pharmaceutical analysis, chronic disease lists and treatment lists. (GPR2)*

**Discussion**

The findings from this case study demonstrate that the processes involved in the care of patients with diabetes were emerging within the private GP rural practice. There was a multidisciplinary team-based approach to clinical management, facilitated by visits from diabetes specialists, referrals to team members and formal and informal communication flows. Registers were used to monitor Medicare billing, identify patients eligible for EPC items and to implement specific health strategies, such as group education classes. The review and follow-up of patients was facilitated by the Diabetes Annual Cycle of Care process and the GPMP. Patient self-care was supported through home monitoring of blood glucose and blood pressure. Apart from reporting activities associated with their adherence to RACGP standards, there appeared to be little baseline reporting by the practice.

The practice's management of data and information, as depicted in the process map, was complex. Data and information were collected by several administrative and clinical staff. It was stored in *Genie*, an electronic patient information system, and protected by several safeguards. Although the practice used their collections to support the administrative and clinical services, there appeared to be little use of the data and information for CQI of their clinical systems.

The management of data and information within the practice was limited by the:

- capacity of the IT system (inadequate to support internal communication flow)
- little use of data and information guidelines;
• inadequate staff capacity in data and information management and IT use, and

• poor quality collections - incomplete records, use of different terms to describe type-2 diabetes.

These limitations were related to several service factors, including the practice's funding arrangements, past experience, decision-making processes, IT systems, and staff capacity and capability.

Prior to the establishment of the amalgamated practice, the practices involved had received the bulk of their funding from billing patients. The practices had been smaller and owned by one or two GPs. They were partially computerised, using two patient information systems, paper and electronic.

Following the amalgamation, the bulk of the practice's revenue was also obtained from the billing of patients. There was little requirement to report to an external funding agency on the use of their funds or on the performance of their service. There were limited levering mechanisms the government could use to influence the practice's delivery of services and their performance. Unlike the government-funded PHC services, the practice decided which programs it would provide, which IT systems it would use, and whether or not it would participate in CQI initiatives. While there appeared to be some influence by the local Division of General Practice and by the RACGP, the practice was managed and run by the principal GP owners.

The GP owners, in response to their awareness of changes within the broader health system, implemented the EPC and MAHS programs and IT systems to improve their capacity to manage patients with chronic disease. However, it appears that only a few changes were made, limited by internal factors, such as the decision-making process, IT systems and staff capacity and capability to support the application of these initiatives. There also appeared to inadequate strategy for managing change by supporting staff to adjust to the new practice environment.

Following the practice amalgamation, the appointment of the managing GP to undertake the dual roles of practice manager as well as clinician created a number of difficulties, particularly within the decision-making process. The managing GP's role encompassed the administrative, business, clinical and professional responsibilities of the practice. However, his capacity to attend to these multiple tasks was not sufficient — the practice, patients and visitors competed with one another for his time. The managing GP also made most of the decisions for the practice, but appeared to have little time to brief
other directors and staff. On occasions, information was not forwarded to others within the practice, resulting in gaps and duplications in the provision of service.

I was advised that, prior to the amalgamation, there were very few communication problems within the smaller practices. However, once the practices had combined and staff numbers had increased, there was a belief that staff were only informed of changes or new developments on a ‘need to know’ basis. The limited sharing of information within the practice appeared to be an emerging problem, exacerbated by the lack of internal electronic mail. The flow of communication internally was, instead, conducted non-electronically, such as verbally with the managing GP or written notes delivered by the triage office.

As previously described, the practice used an electronic patient information system to support the administrative and clinical services. The practice's annual investment in IT ensured that staff had a good quality system and timely technical support. However, there appeared to be little monitoring and evaluation of the system to measure its effectiveness. This resulted in the practices using time-consuming and tedious manual processes. The effective use of the IT system to support data and information management was also dependent on the capacity of the staff.

As previously mentioned, training and professional development opportunities were provided to the GPs and staff by either the managing GP or the local Division. However, there was little training in data and information management and in IT use, because there were few skilled professionals and trainers in the geographic vicinity. The absence of adequate and appropriate training and development opportunities limited the capacity of management and staff in effectively managing their data and information and their IT systems to:

- develop an information policy and strategy regarding the management of data and information to support clinical care;
- implement and apply data and information guidelines to improve the quality of collections;
- effectively manage data and information, particularly performing complex analyses to support CQI activities; and
- effectively use IT systems and the software applications.

The findings from this case study clearly demonstrate that the private rural general practice needed to develop the capacity of their staff in data and information management.
management and IT use. This would require access to experienced professionals and trainers. It appears that the practice also needed to implement quality improvement activities to monitor and evaluate their internal systems and processes.

In my concluding chapter, I draw together my findings from this and the other three case studies to discuss the potential implications for primary health care policy and practice.
Chapter 7: An Urban General Practice

This is the final case study of three different PHC service models. As in the previous chapter, this study is in four parts. Part A provides contextual information about the service. Part B describes the process of care of patients with diabetes. Part C describes the processes and flows of information in the care of patients with diabetes. Part D, the discussion, summarises the main findings. It also describes the service factors which have affected the management of data and information to support the care of patients with diabetes. The IAP project commenced at this Service in May 2006 and feedback was completed by December.

Chapter 8 contains my conclusions from the study as a whole, together with possible implications for PHC policy and practice.

This chapter presents my study of a private urban general practice.

Part A - Contextual Information

In Part A, contextual information is presented about the practice's social and geographical characteristics. This is followed by a description of the practice, including the catchment population, services, funding, structure, decision-making process, information systems, quality improvement initiatives, and training and professional development activities.

Social and Geographical Context

The practice was located in an inner city suburb (RRMA 1) in Brisbane. The suburb, developed in the 1880s, has recently undergone considerable 'gentrification' from a working class population into one of the city's 'up-and-coming' suburbs.

According to the 2001 Census, the total population living within the practice's statistical local area was 9,269 persons, of whom 81% were aged 15 and over, and 15% aged 65 and over [115]. People of Aboriginal and/or Torres Strait Islander descent comprised 1%. The highest level of schooling completed by persons aged 15 and over was Year 12 or equivalent (52%). The percentage of people employed within the 15 years and over age group was 62%, with most employed in property and business (14%), retail trade (12%), health and community services (11%) and education. The unemployment rate
was 4%. The average number of people living in a household was 2.4 and the median weekly household income was between $800 and $899.

**The Catchment Population and Services**

The practice, established in 1947 by a sole practitioner, was located on a busy street in close proximity to a number of hospitals, specialists and other health care services. The practice serviced residents of the suburb as well as the patient population of each of the neighbouring practices which had amalgamated with the 1947 practice to form the practice which was the subject of my case study. I was advised that the majority of the patient population was in the older age groups.

*The practice is almost 60 years of age. It was here at the beginning of the suburb, so it has a lot of old people; but we are also getting new and younger patients. Most people have been coming here for 20 to 40 years. It is a long-term, stable general practice.* (GPU11)

*Twenty years ago, there was a whole street of solo GPs. Now there is only one solo GP. Everyone else has joined or amalgamated, died or left. The model of the solo GP is disappearing and what we are seeing is the rise of the team culture.* (GPU11)

The practice provided 9 consulting rooms and three treatment rooms. It conducted approximately 1,100 consultations weekly [128]. Clinical services included primary clinical care, community nursing, workplace health assessments, care of people with chronic diseases, and visiting allied health services.

**Funding**

The practice received the bulk of its income from patient out-of-pocket payments and Medicare claims.

*We don't bulk-bill, and that is a quality agenda for us, because if you bulk-bill everybody, you end up with an unending stream of patients who don't think twice about coming to the doctor.* (GPU12)

A proportion of funds were also received, through the local Division of General Practice and from government programs, for quality improvement activities and research.
Structure

The present practice, resulting from the amalgamation, had grown from the original 6 GPs to 17 by 2006. The practice was accredited. It was governed by a board of GPs, of which one was the owner or principal of the practice.

In addition to the GPs, the practice provided the services of two practice managers, three nurses, one of whom was a qualified diabetes educator, two community nurses, and eleven other staff, including receptionists, visiting allied health practitioners, and a physiotherapist and pathology collection.

The organisational structure of the practice, as shown in Figure 8, was a network of components based on professional classification, such as the general practitioners, the practice managers and administrative staff and the clinical nurses. There were no specific teams or program areas, such as a diabetes clinic or a chronic disease program.

![Figure 8. The organisational structure of the private GP urban practice.](image)

Decision-making

The practice aimed to provide the 'highest standard of patient care that incorporated a holistic approach toward diagnosis and management of illnesses'. As shown in Figure 8, the strategic direction of the practice was determined by the principal GP, in consultation with the Board and the senior practice manager [123].
X [Principal Director] and I [Senior Practice Manager] do the decision-making together. We have a tribunal every week. We bring issues to that arena because we are a strategic practice and we want to keep moving. (GPU12)

The senior practice manager, acting as the link between the Board and the employees, was responsible for implementing the strategic plan and board decisions and for overseeing operations, such as the recruitment and training of staff and purchasing equipment. The day-to-day operation of the practice was delegated to a second practice manager.

The GPs and the practice managers also acted as portals for receiving information about new initiatives from their professional associations and from other GP practices.

If you want to drive change in your practice, it's got to be through the practice manager. (GPU11)

This sort of practice doesn't work unless you have drivers. You need to have a driver, but the drivers need to be communicators, because if you have a driver who does not get the team on board, then they don't go anywhere. (GPU12)

Apart from the practice managers, there were no program managers or clinical managers. Although the practice managers attempted to engage all clinical and non-clinical staff in the decision-making process via staff meetings or board meetings, participation at the meetings was not compulsory.

If it is a clinical thing or an admin area, we always discuss this at a staff meeting. We open it up for discussion, we describe how we are going to implement it, everyone has input. Sometimes with the doctors, when we offer suggestions, we get some negativity up front and if that is the case, we leave it for a month and then gradually people come round and have their input. It's really a consensus. Sometimes things just have to happen because it's the law. (GPU12)

**Information Systems**

**Internal Use**

**Implementation:**

The practice started using an electronic patient information system in the early 1990s. A government grant funded its initial implementation. In recent years, the practice has
used Medicare-generated funds to purchase new IT hardware and software and system maintenance.

As the smaller practices were amalgamated into the practice, their patient databases were merged with the main IT database. The IT system has also been upgraded to support the growth of the service. A description of the implementation process is described as follows:

On Friday night, we [practice manager, staff, IT consultant, electricians, and software provider] brought up the computers and we converted the databases which took over the weekend with the software company. They finished work here, midday on the Saturday, and this all happened between then and 7 o'clock Monday morning; and we were totally operational without a hitch by Monday. Takes a lot of planning and you have to have the right people involved. (GPU12)

Application

The patient information systems were both paper-based and electronic. The paper-based system included the paper charts. IBA Plexus was the electronic system.

The electronic system was the primary record-keeping system and also supported internal communication. The system was networked to allow sharing of electronic medical files and it provided internal e-mail and a document holding bay. The e-mail system allowed the receptionist to record and relay messages from patients to the GP. A link to the patient's medical file was embedded in the e-mail, so that the correspondence was automatically recorded in the medical file, enabling the GP to gain direct access to the information.

The document holding bay alerted specific users to documents and messages requiring their attention. At regular intervals, hard copy documents such as letters, faxes and notes were scanned into the electronic files; those requiring attention were held in the holding bay.

IBA Plexus had a reporting function which supported the preparation of basic reports, such as a list of patients with type-1 or type-2 diabetes.
The fact that we have to scan 1,000 documents a week is labour intensive; we have got the system happening quite well, but there are still a long way behind where I want them to be. (GPU12)

Although *IBA Plexus* increased the capacity of the practice to manage their data and information, it appeared that it did not support some elements of clinical care. The practice raised their concerns with the system providers, but it appeared that there was limited response to their suggestions.

*It's a matter of getting the industry to give us a product that we need. They're only interested in giving us what they think we need.* (GPU11)

The difficulty in using the system to support the processes of clinical care was demonstrated by the diabetes Annual Cycle of Care process. The ACC template was saved in the system. As new information could not be added to the existing template when a patient returned for a follow-up review, a new template had to be created.

*Computers are nowhere near good enough or sophisticated enough to assist with the cycle of care plans so we have to do own templates...The companies are not interested. It takes a lot of money to develop the system and they say, 'Who is going to pay for it?'* (GPU11)

*There are instances when the paper record is better. I have problem with my computer being not particularly fast. When patient has a long history, and I tell the computer to show me all the notes, it takes the computer a minute or more to bring up all the information. In that case, the computer is a hindrance and paper notes would be faster.* (GPU14)

The practice recognised that staff capacity was also a barrier to effective IT use. As described by one clinician, staff within a practice needed the knowledge and skills to use the electronic information systems, as the programs themselves were usually unhelpful.

*A lot of things that the computer on your desk can't do, but there is lots of things it can do, but you got to know how to do it and you got to know where to input it. A lot of programs don't tell you that.* (GPU11)

The training and professional development of clinicians and staff in IT use was particularly important for GPs who had not previously used an IT system.
Some of the doctors don't want to use the computer system. They do the basics, even to send a referral form is too hard, so they scribble on a piece of paper. I still scan it in. (GUP13)

GP is so in its infancy in its use of computers... Most GP services are not computerised, most are paper-based with a little computer use on the side....Over the years, it's moving more towards computer use. They [doctors] don't trust the system and they don't trust the software. (GPU11)

The IT systems were regularly maintained by the practice managers, an external IT consultant and the software providers. The practice managers attended to basic troubleshooting problems and referred complex problems to the external IT consultant, who provided advice and support for the hardware. The software applications were supported by the relevant provider. Technical support was provided by telephone, e-mail, or an on-site visit.

The practice implemented system safeguards in accordance with the RACGP's standards. These safeguards included system back-ups, tapes, firewalls, passwords and virus protection. As described in the following quote, the practice adopted additional measures to validate these security measures.

Need to consider the security of the data, the longevity of the data. The new standards outline quite strict protocols for back-ups, tapes, firewalls, passwords and viruses. (GPU12)

A lot of practices do it [back up] but a lot of practices put in a tape and think they do back-up but they don't validate that it has been done. (GPU12)

The practice invested a proportion of their budget in maintaining the IT system. This covered installing a new server, upgrading the IT hardware and software, training staff and providing technical support. The practice was aware of the high costs associated in using an IT system as explained in the following quote.

The big thing is not installation, but it's maintaining it. Every computer on your desk will cost you three times the amount it took to install it. People don't understand how much cost is involved. (GPU11)
External Use

Co-ordination of the electronic patient information system with external services was limited due to privacy laws, technical differences between operating systems, and the degree of computerisation within the external services.

The practice shared administrative data and information, such as Medicare billing items, with the HIC. However, *IBA Plexus* was unable to electronically link and share information with other external services. As illustrated by the following quote, the electronic sharing of clinical information required all the health care services involved in the patient's clinical care to be using computerised systems which were in some way integrated.

> *I would like them [documents] to come to us electronically and that won't happen until we get the specialist on board and they are happy to do it. They are not particularly interested and there is no driving interest for them to do it...There will have to be something change in the next 10 years, so we have a totally seamless integration between practices and the hospital; and if that is achieved we will have come a long, long way. (GPU12)*

The external sharing of information involved sending the referrals, letters or summary sheets in hard copy format by post or facsimile.

The extent of the informal information systems and networks external to the private GP urban practice was beyond the scope of my project.

Quality Improvement Initiatives

> *To be fair to these people [service population], we have to have the best system available. (GPU11)*

As expressed in the above quote, the practice was committed to providing ‘best care’ to their patients. The practice was involved in a number of CQI activities, such as practice accreditation and the NPCC.

They also ensured that they received the latest information regarding best practice initiatives *via* their formal and informal linkages with other organisations and institutions.
The practice, a member of the local Division of General Practice, also provided support and mentoring to other practices.

*We are involved in the extended medical and health care community. That entails going to other practices and meeting other people, and that all helps to build the practice. We mentor and share our ideas.* (GPU12)

**Training and Professional Development**

The training and professional development of the practice's clinicians and staff included an orientation and induction program for new employees and regular training and development activities.

The orientation and induction program was provided by the practice managers. It introduced the practice's policies and procedures, roles and responsibilities, and processes. The program also involved an orientation to *IBA Plexus*.

The training and professional development activities were organised by either the practice managers or the Division. The GPs participated in regular training and professional development activities which were usually provided after-hours or on weekends.

The practice encouraged their non-GP staff to participate in at least one up-skilling session per year and provided funding for them to attend. The practice kept informed of the relevant training and development activities via the practice managers and through their formal and informal linkages with other organisations.

*We work really hard to have capacity to be able to cater for our patients...the staff are funded to go to as many educational activities that they want to go to. The job descriptions require each staff to go to one up-skilling every year. [X ]and [Y] are proactive, we keep our ear to the ground and we are the means whereby the information is forwarded to them [the staff].* (GPU12)

Training sessions were also provided by the practice managers, the Division and the IBA Plexus consultants.
When there were changes to the software, everyone got up-skilled. It took 3 weeks, involving 80 hours per week. We used the conference room, borrowed lap-tops, and did training sessions for staff. (GPU12)

However, as described in the following quotes, it appears that this training did not meet the needs of all the practice staff.

We get limited program training. When they put in new programs, it's never enough for me. In all sorts of ways, I need to be more computer literate. I'm at an awkward age, too old to learn about computer literacy. (GPU15)

I need a good 4 to 5 hours a week to get my head around things. If there is a big change, like broadband for health or work choices, I need time to get my head around that. (GPU16)

There were also difficulties related to when the activities were provided, particularly for the GPs and regarding participation by non-GP staff.

The barriers are trying to get everybody together. We have staff meetings every 6 weeks, but they’re not compulsory; staff can’t attend, don’t want to come or have other functions. So we’ve talked about: ‘Do we pay them, do we give them incentives to come?’ (GPU16)

The practice was aware of these barriers and emphasised that more resources were needed to adequately train and up-skill GPs and non-GP staff.

Needs a huge injection of money and expertise, doctors have to be up-skilled to use the keyboard... We need to have thinking time funded. Not out of hours, because they [doctors] are tired, but that’s when most of education time is done. So there has to be time allotted, thinking time, non-contact time during normal hours, when the brain is actually functioning. (GPU11)

Part B – The Care of Patients with Diabetes - Overview

Here I provide an overview of the process of care of patients with diabetes, including the multidisciplinary team approach, clinical guidelines, disease register, follow-up and review process, baseline reporting activities and factors relating to the patients.
The Multidisciplinary Team Approach

The multidisciplinary team involved in the clinical care of a patient with diabetes included the administrative and clinical practice staff, visiting allied health practitioners and specialists from both public and private external health services. Clinical care also involved specialist clinics at the hospitals.

Now we have a team of doctors plus professional management, such as practice managers, nurses, psychologist, podiatrist, pathologist, speech pathologist, and it goes on and on. (GPU11)

Similar to the other cases studied, the process of care of patients with diabetes commenced when a patient seeking a consultation with the GP booked an appointment with the receptionists. Once an appointment was confirmed, the patient was directed to the waiting room. The consultation involved a review of the patient's electronic medical notes; history taking; physical examination; and undertaking blood and urine tests or measurements. The consultation might also have involved the prescription of medications, requests for further tests, referrals for specialist review or activating the electronic recall and reminder function for future appointments.

With the introduction of a diabetes educator and community nursing service, the practice also provided services such diabetes reviews, patient education, home visits and health assessments.

As shown in Table 4, referrals made to a diabetes specialist in the last 12 months were recorded in 72% of medical files, with most referrals (48%) having been made to the ophthalmologist. These findings do not include referrals made over the phone or by word of mouth.

I think we can manage most diabetics in general practice; it's only the difficult and complicated ones who need to go to specialist care. (GPU11)

54 The administrative staff includes the reception team, administration assistant, and the practice managers. The clinical staff includes the GPs, RNs (including community nurses) and diabetes educator. The visiting allied health specialists include podiatrist, dietician, speech therapist and psychologist.
Communication between members of the multidisciplinary team appeared to be facilitated by referral letters, telephone discussions and e-mail. Face-to-face meetings were held between the GP and diabetes specialist, but there appeared to be few meetings involving the whole team.

**Clinical Guidelines**

The practice endorsed the use of Diabetes Australia’s and the RACGP’s clinical guidelines. These were accessible in hard copy format and *via* the Internet. The diabetes ACC plan was introduced with the commencement of the diabetes educator service. It appeared that the practice was beginning to refer to these plans to guide their clinical care.

**Disease Register**

The practice used electronic patient lists to monitor Medicare claims and to update contact lists. The diabetes educator used the lists to identify diabetic patients who were eligible for assessments and reviews. There appeared to be some use of registers to plan and evaluate health service activities, such as evaluating the effectiveness of the community nursing service.

The practice attempted to maintain the lists by regularly asking patients to confirm their contact details. The patient list I used for this study's chart audit contained the names of patients with different types of diabetes (type-1, type-2 diabetes and gestational diabetes). In addition to listing regular clients of the service, there were some who had died and some who had not been to the service within the previous two years.

*Easy to get the diabetes register from the computer, but maintaining the register is much more difficult and boring. People don't understand maintenance is everything in any system or register. (GPU11)*
<table>
<thead>
<tr>
<th>Diabetes items</th>
<th>Completeness of records</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographic details and Medicare numbers</td>
<td>All information regularly collected and updated</td>
</tr>
<tr>
<td>Smoking status; Exercise level; Alcohol status</td>
<td>Smoking status - 62%</td>
</tr>
<tr>
<td></td>
<td>Exercise level - missing</td>
</tr>
<tr>
<td></td>
<td>Alcohol status - missing</td>
</tr>
<tr>
<td>Medical summary sheet present</td>
<td>Medical summary sheets present in all patient files on Genie</td>
</tr>
<tr>
<td>Management plan present</td>
<td>50%</td>
</tr>
<tr>
<td>Clinical goals and self-care goals recorded</td>
<td>50 %</td>
</tr>
<tr>
<td>Recall and reminder letter (diabetes specific) sent</td>
<td>46%</td>
</tr>
<tr>
<td>Referrals56 in the last 12 months and ranking of referrals</td>
<td>72%</td>
</tr>
<tr>
<td></td>
<td>Most – ophthalmologist (48%), endocrinologist (20%), and podiatrist (26%)</td>
</tr>
<tr>
<td></td>
<td>Least – dietician (6%) and diabetes educator (18%)</td>
</tr>
</tbody>
</table>

55 The time period over which the completeness of diabetes information was recorded was 2 years. For the GP urban practice this was from the 1 July 2004 to 31 July 2006.

56 The table describes the proportion of referrals made by the GP to members of the multidisciplinary team (as described by the RACGP), which includes a diabetes educator, a dietician, a podiatrist, an endocrinologist or diabetologist, and ophthalmologist or optometrist. An oral health professional, an exercise professional and
<table>
<thead>
<tr>
<th>Diabetes items</th>
<th>Completeness of records</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>68%</td>
</tr>
<tr>
<td>BP – all tests completed</td>
<td>64%</td>
</tr>
<tr>
<td>BP – average prop of tests per quarter (%)</td>
<td>86%</td>
</tr>
<tr>
<td>HbA1c – all tests completed</td>
<td>68%</td>
</tr>
<tr>
<td>HbA1c – average prop of tests per quarter (%)</td>
<td>83%</td>
</tr>
<tr>
<td>Weight – all tests completed</td>
<td>38%</td>
</tr>
<tr>
<td>Weight – average prop of tests per quarter (%)</td>
<td>43%</td>
</tr>
<tr>
<td>Waist – all tests completed</td>
<td>0</td>
</tr>
<tr>
<td>Waist – average prop of tests per quarter (%)</td>
<td>6%</td>
</tr>
<tr>
<td>BMI – weight/height2</td>
<td>48%</td>
</tr>
<tr>
<td>Eye</td>
<td>30%</td>
</tr>
<tr>
<td>Foot check</td>
<td>28%</td>
</tr>
</tbody>
</table>

specialist counselors were not included in this list. In the GP urban practice, referrals were made to visiting multidisciplinary team members and those based in external health department or centres, such as the public hospitals and private clinics.
Follow-up and Review

The follow-up and review process was facilitated by the GPMP, the ACC review and the electronic recall and reminder function.

The GPMP, initiated by the diabetes educator or the community nurses, was used to organise some of the recall and reminder prompts. The plans were a recent development within the practice and were present in 50% of the audited files. (Table 4)

The diabetes ACC process was also a recent initiative, implemented in conjunction with the diabetes educator service. The diabetes educator initiated the process of care and a copy of the template was saved in the patient's electronic file. The process for each patient was monitored regularly. There were no automatic prompts for the ACC process because the template was not integrated into IBA Plexus.

Most patients in the practice do not have their SIP up to date. It's too hard, as the GPs only get 15 minutes for a consultation and patients are mostly coming in for something else. They [GPs] will check if bloods done, but commonly don't do a foot check. There is no warning on the computer to say that the SIP needs to be done. (GPU13)

In the absence of automatic prompts, the diabetes educator reviewed each chart and noted, in the progress notes of the medical file, an alert to the GP of tests which were due or overdue.

I'm only checking on my patients. If I find that they [GPs] are not doing it, I give the responsibility back to them ...If the GPs can see that it is due, and can check what is due, and see that it's not done. [GPU13]

The recall and reminder function was also a responsibility of the GPs. When a recall was due or overdue, and RN made up to three phone calls to the patient. If the calls were unsuccessful, a letter was sent by registered mail. The letters were printed out by the practice manager and forwarded to the patient's primary GP for authorisation. Once the patient returned to the practice, the GP was responsible for deactivating the recall and reminder prompt.

All recall letters have to be signed off by the doctor, which is a nuisance because I always feel obliged to go back and check that it [the letter] is relevant, because you don't want to send out something that is not current and will cause confusion
and get them to come back for no good reason...Doctors have to cancel the recall and reminder function and duplication could happen. (GPU14)

When we print out those letters for me to sign and send for diabetic recalls, I usually don't send them, because it is something you talk to them about when they come in. And when they are 85 and they come in once a month, they don't need to be sent a letter once a month. It [recall and reminder] helps to remind you that I need to check that and that, but you don't need to send out in the mail because it is confronting and they often get quite confused (GP15).

There was no evidence of flow or review charts.

**Baseline Reporting**

As illustrated by the following quote, the practice was beginning to assess and report on their clinical activity as part of their engagement in CQI activities such as practice accreditation and NPCC.

> Every patient who comes here with diabetes thinks that we are good blokes, thinks we are doing the right thing. But if you look at our figures and compare them to others, we could do better and that's what we are trying to do with chronic disease management. That is why we employed a diabetes educator to help us with that, to help make sure that we keep on track with the things we should be doing, like the cycle of care. (GPU11)

> General practice has not measured themselves, whereas the hospitals do it all the time...Very difficult as nobody has taught us how to do it and we have to find out ourselves and have to have time to do it. (GPU11)

**Factors Relating to Patients**

The practice’s care of a patient with diabetes included facilitating patient self-care, such as providing a diabetes educator service. The practice was aware that the effectiveness of these interventions was limited by factors relating to the patients, such as compliance and the availability of practice resources.

> This is an exhausting disease to look after, it's boring, and they have to look after it every day. You try to impress on the patient this is a silent disease that will continue destroying your body. Hard to impress on patients...You need to be vigilant without nagging. (GP15)
Patients don't come in about their diabetes, but come in about something else and then you think, 'Oh you're diabetic and I better check all the screening is done'. This turns a regular consultation into a long one...If they also have heart disease or renal failure, this limits the options to treating their diabetes. This is not an uncommon scenario. (GPU14)

Part C - Processes and Flows of Information in the Care of Patients with Diabetes

This part describes the processes and flows of information in the care of patients with diabetes, which includes a description of the processes, data and information management guidelines, past experience, collection, storage, access, analysis and use of data.

The process map (Figure 9) developed for this practice was based on data collected from my general observations, interviews and informal discussions and not from clinical observations because the practice wanted to minimise the risk of allowing me to observe clinical encounters involving patients who had refused to participate in this study. The map is not a comprehensive representation of the information processes however, it was apparent that the information processes involved in the clinical care of a patient with diabetes involved a number of administrative and clinical staff using various modes and formats to send and receive information.

There were loops in the flow of information as part of the recall and reminder process, where overdue notices were sent back to the GP for authorisation. There were occasions when the flow of information arrived at a dead-end, that is, when information was received by a person or system, but did not go beyond that point, for example, the paucity of information received from specialist diabetes clinics. There was also evidence of duplications and gaps in information flow, for example, when information in a medical file was missing because the relevant document had been scanned into another patient’s file.

The complexity of the information processes involved in the care of patients with diabetes was apparent in the characteristics and the degree of interaction between the individual components. These are described in the following sections regarding data and information collection, storage, access, analysis and use.
Figure 9. The information processes involved in the clinical management of a patient with diabetes by clinicians within the GP urban service. (IAP, 2006)

Data and Information Management Guidelines

The data and information management practices adhered to the NPP and the RACGP’s standards [83, 85, 129, 130].

57 The process map for the GP urban practice (Figure 6) was developed from data collected through interviews and not from observations. As such, it is not a comprehensive representation of the information processes involved in the clinical management a patient with diabetes by clinicians within a private GP urban practice.
Past Experience

As previously mentioned, the practice has grown since its establishment in the late 1940s. The practices which amalgamated were smaller and run by one or two GPs. Those practices had used their data and information collections primarily for administrative purposes, such as billing patients, and for clinical purposes, such as clinical record-keeping. Some of these practices were computerised, but most were using paper-based systems. Some had been familiar with the RACGP’s standards and the importance of practice accreditation, but had been tentative about using their data and information collections to monitor the performance of their clinical activities.

*General practice does not use their information to guide and plan their services. 30% of practices within twelve months will have some idea of these types of skills through the NPCC (National Primary Care Collaboratives). Of the other 70% that have not been exposed, they are saying, 'No way, this is government wanting to know too many things'. They are precious with their data... they don't want to know. They know every patient who comes... they do the best job they can possibly do and that's it. They don't know if they are giving a good service or a poor service, and they don't want to know, because if they find out they might have to do something about it. (GPU1)

The competence of the GPs in data and information management and IT use, particularly for CQI, also appeared to be variable. This appeared to be due to the limited training and professional development activities provided in these areas, as well as the difficulty in finding time to participate in these activities.

*It's a culture thing. There is no culture of measurement in GP and that is something that we need to address... Younger graduates want to come and go as quickly as possible. They want to do 3 sessions per week, fly in and fly out and not talk to everybody, not chew the cud over lunch. They don't want to come to Drs’ meetings... Very few new graduates want their own practice. They just want to work limited hours and not worry about business, certainly not worry about measuring the practice or chronic disease management or benchmarking the practice in any form at all. (GPU1)

In overcoming these barriers to change, the private urban practice adopted a 'strategic' approach to management involving system 'drivers', such as practice managers.
If we develop general practice, we need to get out and see what other people are doing, and if you're busy working in your own practice and not got time to go out, it's very hard to develop models. There are so many people out there with great ideas and you can go and see what they are doing. Talk to them. Ask why do they do that? Why don't they do that? And how do we move along? Strategy is very important...If you want to drive change in your practice it's got to be through the practice manager. (GPU11)

This sort of practice doesn't work unless you have drivers. You need to have a driver, but the drivers need to be communicators, because if you have a driver who does not get the team on board, then they don't go anywhere. (GPU12)

Collection
Data and information were collected by various administrative and clinical staff at different times using various modes and formats.

Administrative information collected by the reception team included a patient's name, date of birth, telephone numbers, address details and Medicare and Health Care Card numbers. This information was collected at each visit for billing purposes and to ensure that correspondence, such as appointments and recall and reminder letters, were sent to the correct address.

Clinical information was collected by the GPs, registered nurses and visiting specialists. This information included a patient's family and social history, medical history, reason for presentation, details about their current condition and the results of clinical tests, such as blood sugar levels and blood pressure measurements. The results of pathology tests were automatically downloaded into the electronic medical file.

My chart audit assessed the completeness of information on the care of patients with diabetes recorded in the medical files (Table 4). As demonstrated, medical summary sheets were present in all of the 50 audited electronic files. Information relating to the care of patients with diabetes, were regularly recorded in the medical files: height (68% of files), blood pressure (86%), glycosylated haemoglobin (83%), weight (43%) and BMI (48%). Waist circumference was the least recorded item (6%). (Table 4) The absence of waist measurements appeared to be related to the clinician's adherence to
measuring BMI (Body Mass Index), which required weight and height measurements, as per the SIP requirements.

That depends on how good the information is put in by the doctor who has seen them [the patient] before. Not everybody documents what they have done well. They may have done it and looked at lots of things and done the appropriate things, but it's not documented that it's done, so it's not as easy to go back and find that information... Bits of information go missing. Letters that don't arrive or arrive and get scanned into the wrong file. (GPU14)

There were also differences in how and where information was recorded within the medical file. I discovered that information relating to the care of patients with diabetes was recorded using varying terms (eg, Type II, Type 2, NIDDM, diab, diabetes type II) and in various sections of the medical files. The disease registers also listed active and inactive patients with both types of diabetes.

Retrieving data is very difficult. It all depends on coding, so we have got to get all people to code. The software system does not make it easy. (GPU11)

Although the practice was aware of the importance of improving their data and information practices, the degree to which the practice engaged in these activities depended on the cost of the exercise versus the benefit to the practice.

For general practice I look at: if I am going to do this, how is it going to be paid for and is there a benefit. If there is an inordinate amount of time that somebody has to put into it, it may not be cost-effective for the practice. At the end of the financial year, if you haven't made a profit, then you're not in the business. We have been very specific and directional with what we have done; we have not compromised what we offer and we have been able to support that with the patient numbers. (GPU12)

Storage

The information systems were both paper-based patient and electronic. The paper-based information system included the paper charts. The electronic system included the IT, such as computers and printers, and the software applications, such as IBA Plexus, word processing, e-mail and the Internet.
*IBA Plexus* was the primary storage site for most of the data and information. All hard copy documents, such as letters, medical notes and files from other services, were regularly scanned into the electronic file. The practice also had a storage facility for the archived paper charts.
Access

Access to the medical files was restricted to employees and authorised visitors. The electronic files were opened to update contact details, to store correspondence, to follow up and review a patient's care and to record relevant data and information pertaining to that care.

Access to and within the electronic files was protected by several security measures, such as usernames, passwords and internet firewalls. An employee was allocated a user name and a password to gain access to the electronic files. Additional safeguards were implemented to restrict their level of access to information. For example, the GPs could gain access to the entire file, while reception staff were restricted from gaining access to certain sections, such as the progress notes and the pathology results.

As in the rural practice, patients were permitted access to their files. This process required a written request from the patient and had to adhere to NPP and RACGP standards [83, 130].

The practice was also allowed to disclose information for the purpose for which it was collected or for another directly related purpose.

Analysis

IBA Plexus supported the analysis of data and information. There was some analysis of data and information by the principal GP, practice managers, and community nurses. Whilst much of the analysis was undertaken for administrative purposes, such as planning budgets and monitoring expenditure, the practice was beginning to analyse their data to monitor clinical care and undertake research. There were some difficulties associated with trying to analyse the practice's data, as illustrated by the next quote.

Assistance for some of these activities was received from the Division.

Trying to work out how many diabetes patients are on the database... doctors have to code properly, you have to code everything. [With] MD you could feed in diabetes type-1 or -2 or diabetes, and it spits everything out. But this [electronic information system] won't do that. We are part of the collaborative, but we can't get the data out of there that we would like for the collaborative. (GPU16)
**Use**

The practice used their data and information collections primarily for administrative purposes. These included patient and Medicare billing, developing an annual budget and monitoring expenses, and organising work timetables.

The collections were also used to support clinical activities, such as clinical care, clinical decision-making and co-ordinating a patient's care.

As previously mentioned, there was some use of data and information for research purposes and there appeared to be increased use of the collections for CQI purposes, such as the NPCC.

**Discussion**

The findings from this case study demonstrate that the processes involved in the care of patients with diabetes were emerging within this urban general practice. The multidisciplinary team based approach involved administrative and clinical staff from within the practice and visiting specialists and was facilitated by referrals, internal electronic messaging, telephone discussions and informal communication flows.

Registers were used to monitor Medicare billing, to update contact details and to identify patients eligible for EPC items. Systems were in place to ensure that patients were regularly reviewed. This was facilitated by the diabetes Annual Cycle of Care process and the electronic recall and reminder prompts. Patient self-care was emerging, with the support of the diabetes educator service. The practice was also becoming increasing engaged in baseline reporting activities for CQI of their clinical care systems.

The components of data and information management were also evident. Data and information were collected by several administrative and clinical staff, stored in an electronic patient information system and protected by several safeguard measures. The collections were analysed by a select group of clinicians, with assistance provided by external organisations. This analysis was used to support the practice's administrative and clinical services and there appeared to be increased use to monitor the performance of the practice's systems of clinical care.
The management of data and information within the practice was limited by:

- inadequate use of data and information guidelines;
- inadequate staff capacity in data and information management and IT use; and
- poor quality collections - incomplete records, the use of different terms to describe type-2 diabetes.

These limitations were related to several service factors, including the practice’s funding arrangements, past experience, IT systems and staff capacity and capability.

Similar to the rural general practice, the urban practice received the bulk of its funding from Medicare and patient-billing. There was, therefore, little requirement for the practice to report to an external funding agency on the use of their funds or on the performance of their service. The principal owner and the board of GP directors decided which programs would be implemented, which IT systems would be used, and whether or not to participate in, or implement, CQI initiatives. As with the rural general practice, there were limited levering mechanisms which the government could use to influence the practice’s delivery of services and its performance. The practice was primarily managed and run by the principal owner, the Board and the practice managers, with some support and influence provided through the local Division, the RACGP and other professional associations and institutions.

The practice appeared to take a strategic approach to service delivery. It kept actively informed of new developments and changes through its formal and informal linkages with several professional associations and educational institutions. It provided mentoring to other general practices. It employed practice managers to run the practice, so that the GPs could focus on clinical care. It was actively involved in several CQI initiatives and encouraged its clinical and administrative staff to attend regular up-skilling courses. The practice’s aim of having a paperless record-keeping system was achieved by using a system which supported internal communication, administrative and clinical functions. However, it appeared that the practice’s strategic approach was affected by the past experiences of some of their GPs and by the attitudes of their younger GP recruits.
As described, several smaller practices, which had had been in operation for 20 or more years and which were run by one or two GPs, had amalgamated. Those smaller practices had been using either a paper-based patient information systems or were partially computerised. The GPs in the amalgamated practice were familiar with the requirements of the RACGP standards and practice accreditation, but there appeared to be no management of data and information to monitor the performance of clinical care systems for CQI purposes. The GPs also appeared to have inadequate skills and knowledge in managing data and information for CQI purposes and in effectively using an IT system to support this process. The younger GP recruits, on the other hand, had experience in using IT systems, but appeared to have little interest in the administrative and clinical services of the practice and even less interest in CQI activities.

The design of the IT systems and staff capacity also limited the practice's effective management of data and information to support the care of patients with diabetes.

As previously described, the practice used one electronic patient information system to support their administrative and clinical services. Its annual investment in the IT system ensured that staff had access to good quality IT hardware and timely technical support. However, the IBA Plexus system did not support some elements of clinical care and was unable to be modified in a timely manner. The compatibility of the system appeared to be related to the practice’s having not been adequately involved in the design of the system. The effective use of the system to support data and information management was also dependent on the capacity of the staff.

The clinical and administrative staff appeared competent in using the IT system to support their duties, but there appeared to be differences in data and information management practices and IT use. As previously mentioned, training and professional development opportunities were provided to the GPs and staff. However, it appeared that the content and timing of the training activities was inadequate. The practice was aware of these difficulties and recognised the importance of fostering an information culture within the practice. However, access to funds and the availability of study time limited their attempts to improve the capacity of the practice and to obtain expert advice. For most of the clinicians, their training and professional development time occurred after-hours. The practice's investment in improving data and information
management practices and IT use also appeared to be weighed up against the cost of the exercise versus the economic benefit to the practice.

The absence of adequate and appropriate training and development opportunities limited the capacity of management and staff to effectively manage their data and information and their IT systems to:

- develop an information policy and strategy regarding the management of data and information to support clinical care;
- implement and apply data and information guidelines to improve the quality of collections;
- effectively manage data and information, particularly performing complex analyses to support CQI activities; and
- effectively use IT systems and the software applications.

The findings from this case study clearly demonstrate that the urban general practice was aware of its limitations in managing data and information to care for patients with diabetes. The practice appeared to be well-informed of the challenges faced by the broader GP sector and by individual practices.

It appeared that the practice had implemented a number of strategies to improve their internal systems and processes. However, additional resources were required to provide adequate training and professional development opportunities for clinical and administrative staff and to support the recruitment of relief staff to allow clinicians to attend these training opportunities at an appropriate time. The case study also demonstrates that IT system providers need to include the primary users of the system in their planning, development and application phases. There is also a need for resources to support such general practices in monitoring their systems within a CQI framework.

In my concluding chapter, I draw together my findings from this and the other three case studies to discuss the potential implications for primary health care policy and practice.
Chapter 8: Conclusion

The rise in the prevalence of chronic diseases, the incidence of poor patient outcomes and increasing expenditure on health care have resulted in calls for best practice, cost-effectiveness and accountability in the health system. Central to such reform is the effective management of data and information.

In this chapter, I draw together my key findings from the four case studies and discuss them in line with my original research questions:

- How were patients with chronic diseases cared for by primary health care services, with a particular emphasis on the care of patients with diabetes?

- How were data and information managed by primary health care services to support the care of patients with chronic diseases, with particular emphasis on the care of patients with diabetes?

- Which service factors affected the management of data and information? and

- What are the implications of my findings for primary health care policy and practice?

However, before doing so, I will set out the strengths and limitations of this study.
Strengths and Limitations

The strengths and limitations of this project are summarised in Table 5.

Table 5. The study’s strengths and limitations

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Involvement of three models of PHC service</td>
<td>Case study design</td>
</tr>
<tr>
<td>Processes involved in recruiting the sites</td>
<td>Selection of PHC services</td>
</tr>
<tr>
<td>Length of time spent in the field at each PHC service</td>
<td>Focus on practices and limited primary data collection regarding policy processes</td>
</tr>
<tr>
<td>Process involved in the feedback of results to the PHC services</td>
<td>Inconsistencies in chart audit</td>
</tr>
<tr>
<td>Level of staff participation in the project</td>
<td>Informal information networks not included in the study process</td>
</tr>
<tr>
<td>The quality of quantitative and qualitative data collected</td>
<td>Length of time between the collection of data and the presentation of results</td>
</tr>
</tbody>
</table>

Strengths

As previously mentioned, the selection of services was based on the common models of primary health care service in Australia and on service factors such as the size of their clinical workforce, specialisation in the care of patients with diabetes, and their use of an electronic patient information system. The involvement of four PHC services (one ACCHS, one state government CHS and two private general practices) ensured that the findings from this study could be seen to reflect these three models of PHC service.

The consultation process involved in recruiting the services was designed to ensure that each service was fully informed of the project and that there was an opportunity for the services to have input into the design and implementation of the project and to obtain feedback on the findings. As previously described, the process involved an introductory phone call to the service’s chief executive officer or manager to introduce myself, to present my PhD project proposal, and, if the representative was interested, to seek advice about how I could engage the service in my research. Following the initial phone
discussion, an introductory letter, information brochure, and my *curriculum vitae* were forwarded to the service. I followed up with a phone call.

The consultation process also enabled me to obtain a better understanding of each service and to establish and build relationships with key personnel. My understanding and knowledge of the services and my relationship with administrative and clinical staff were enhanced by the approximately two weeks I spent at each service. In addition to the processes involved in my study, I also participated in informal discussions with staff during morning tea and lunch breaks, attended staff meetings and assisted with some data and information management tasks.

The feedback of my findings involved a workshop with management and staff at each service and the development of a project report for each site. This allowed the management and staff to discuss the accuracy of my findings and their implications for the service. Participants also commented on the project.

The managers and staff from each of the PHC services were very helpful and supportive. They contributed their time to participate in the process mapping and interviews and assisted in helping me to better understand their roles. Although, at times, this project touched on sensitive and confidential issues, the managers and staff were trusting and open with their responses.

An additional strength of this project was the wealth of qualitative and quantitative data collected from my observations, interviews, reviews of documents and chart audits. This information was rich, providing me with the information needed to obtain a detailed understanding of each service, their processes of care of patients with diabetes and their management of data and information.
Limitations

As previously indicated, my study was limited by its use of the case study design. The methods used to obtain data from each of the services were similar, but modifications were made depending on the characteristics and requirements of that service. For example, the process map developed for the urban general practice was not developed from clinical observations but from my interviews and informal discussions with staff and from my observations and personal reflections. There were also no findings for the CHS regarding the recall and reminder of patients.

The analysis and interpretation of the data, particularly arising from the observations and interviews, were also subject to personal bias. Whilst expert advice was obtained from my supervisory pane, this process was primarily performed by me. Whilst my findings were to some extent validated by each service during the feedback workshops, there were no other tests of validity.

A second limitation was the selection of the four PHC services from Queensland only. This was due to my place of residence, which determined my ease of access to the services. However, compared with other states and territories, there appeared to be little variation in the ACCHS and general practice models, but the state health department model was specific to Queensland. Due to the modifications in data collection methods for each case study, the likelihood of personal bias in the analysis and interpretation of the data, and the differences between the models of primary health care services within Australia, the findings from this project cannot, therefore, be generalised to other similar PHC settings.

An additional limitation was the primary focus on PHC services. A review was undertaken of data and information management strategies and policies within the broader health care environment and I observed the impact of these policies at the service delivery level. However, there was no primary data collection regarding the effects of these strategies and policies on the PHC services, for example, the impact of initiatives such as Broadband for Health and HealthConnect on the PHC services’ management of data and information.
This project also focussed primarily on formal information networks and excluded informal information networks, thereby excluding informal discussions among staff within each service and with staff of external organisations. As previously mentioned, inconsistencies were also identified between the protocols for the care of patients with diabetes and the protocol I used for my chart audit. The recognised clinical guidelines suggest:

- regular home testing of blood sugar levels (BSL),
- testing of BMI every three months, and
- an eye check every two years.

However the protocol I used for my chart audit recommended measurements were taken from BSL tests performed by the clinician and tests for BMI and eye checks occur at 12 monthly intervals. This error was identified before my audit at the CHS and general practice sites, but to maintain consistency across all four sites the audit test was not changed.

An added limitation of the project was the length of time that has elapsed between the completion of data collection (November 2006) and the publication of findings (March 2008). I recognize my case study findings will not reflect any changes that have occurred within the sites since the completion of the project. However, my subsequent involvement in the Support, Collection, Analysis and Reporting Function project (SCARF), a part of the evaluation of the Healthy for Life program, has allowed me to observe changes within the PHC sector that relate to the findings of this study and throughout the duration of my candidacy.

**Research Question 1: How were patients with chronic disease cared for by primary health care services, with particular emphasis on the care of patients with diabetes?**

As demonstrated in Table 6, the systems involved in the care of patients with chronic diseases, in particular diabetes was emerging within all four sites. These systems included the multidisciplinary team-based approach, clinical guidelines, a disease register, patient follow-up and review, support for patient self-care and baseline reporting. The multidisciplinary team-based approach included reception and
administrative staff, GPs, RNs, Aboriginal health-workers, and visiting clinicians and specialists.

As shown in Table 6, the team-based approach was facilitated by GPMP, referrals, letters, electronic messaging, telephone calls and informal discussions. There appeared to be better engagement of the multidisciplinary team within the CHS, primarily due to the regular outreach specialists clinics provided by a team of clinicians from the diabetes centre. The multidisciplinary team-based approach by the general practices was also facilitated by visiting clinicians. However, within all of the services, there appeared to be little discussion and few meetings involving the whole team.

Although clinical guidelines had been endorsed by each PHC service, there appeared to be little use of these guidelines by clinicians. As demonstrated in Table 6, the CHS referred to the GPMP, whereas the general practices utilised the diabetes ACC recommendations. The ACCHS made little use of clinical guidelines.

The services were using disease registers for a range of purposes, such as monitoring Medicare billing, updating contact lists, and identifying patients with diabetes who were due for review or eligible to participate in diabetes programs. There appeared to be little use of the registers for CQI of systems for clinical care or for population health purposes. The registers were paper-based, with little use of electronic registers. All the services also appeared to have difficulty in maintaining the registers. As shown in Table 6, the registers used by that service and analysed in my chart audit listed patients with type-1, type-2 and gestational diabetes, patients who were regular clients, patients who had not been to the service within the last 24 months and deceased patients. The urban general practice attributed their difficulties to inadequate staff awareness of the importance of disease registers and the tediousness of the task.

There appeared to be a systematic approach to regularly reviewing patients. As demonstrated in Table 6, the follow-up and review process was facilitated by GPMPs, electronic recall and reminder system and the diabetes ACC process. The follow-up and review process required adequate staff, time and IT systems and, as such, differed in each service. The ACCHS and general practices coordinated their own recalls, but the CHS relied on referrals from the private GP. The selective use of the system by the rural
general practice for recalls and reminders was used for blood tests only. None of the services made much use of flow charts or review charts.

Support for patient self-care was also emerging within the four services. This involved home monitoring, group education classes, provision of educational resources and diabetes equipment.

There was also an emergence of activities to monitor the services' clinical care systems and patient outcomes for the purposes of CQI. As demonstrated in Table 6, this was evident in three of the four services. These baseline reporting activities had been implemented because of a variety of external factors, which, in the case of the ACCHS and CHS, related to their funding. The use of data and information within the services is discussed in the next section.

The emergence, within the services, of the systems of care for patients with diabetes appeared to be influenced by the development of several external initiatives, such as the EPC, CIP, EMPHC and MAHS. These initiatives facilitated the services' provision of a multidisciplinary team-based approach and the regular follow-up and review of patients. However, it appeared that these systems of care were in various stages of implementation. As previously demonstrated in the case study chapters, the management of chronic disease within the ACCHS and the CHS was delegated to a chronic disease team or clinic, whereas the GPs primarily coordinated the patient's care in the general practices. The system of care appeared to be inconsistent and uncoordinated, as demonstrated by the infrequent use of clinical guidelines, the selective use of the recall and reminder system and the only occasional team discussions and referrals.

The services identified a lack of resources as contributing to these gaps. However, other contributing factors included the capacity of staff, the application of the IT system and the management of data and information. The services' management of data and information to support diabetes patient management is described in the next section.
Research Question 2: How were data and information managed by the primary health care services to support the care of patients with chronic diseases, with particular emphasis on the care of patients with diabetes?

The management of data and information involved its collection, storage, access, analysis and use. As depicted in the process maps, this involved the interaction between people and information systems, supported by information flows which formed loops (where information went from sender to receiver and back to the sender), dead ends (where information stopped at the receiver or within the information system), gaps (where information failed to reach its destination) or duplications (where the same information was received more than once). The degree of interaction between components and the characteristics of information flows differed for each PHC service but overall was complex.

As demonstrated in Table 7, the management of data and information was guided by the NPP and a set of principles developed or endorsed by each service. Data and information were collected by a number of different people, including administrative staff, clinicians and visitors; depending on the service, it was recorded in either a paper medical file or an electronic medical file or in both.

As demonstrated in Table 7, the CHS used both types of files, but visiting clinicians used only the paper medical file. The use of paper-based medical files in combination with electronic medical files had also been apparent in the ACCHS and in the general practices; however, these services had since converted to paperless recording systems. These services regularly scanned hard copy documents into the electronic medical files. The data and information collections were protected by a number of safeguards. Although access was restricted to authorised personnel, patients and other health providers were, in some circumstances, permitted access. This process was guided by the NPP and protocols developed by each service. The safeguards for the paper medical files included storing them in a secure and lockable facility with access and use of the files monitored by reception staff. The measures for the electronic medical files included firewalls, user names and passwords.

The data and information collections were used by the services for administrative and clinical purposes. The data first had to be analysed, which was facilitated by the
electronic patient information systems operated either by trained internal staff or by professionals from external organisations. As demonstrated in Table 7, the ACCHS and CHS were experienced in submitting their data and information to government departments as part of their reporting requirements. Their data and information were analysed according to the Department's requirements. These included monitoring the performance of the service in order to determine their level of funding. The general practices, on the other hand, had few reporting requirements, because the bulk of their funding was received from Medicare and from patients. Their data were analysed by GPs within the practice or by professionals based in external organizations, such as their local Division of GP.

The use of the data and information collections for administrative purposes included monitoring Medicare claims and the billing of patients. The clinical purposes included patient record-keeping, clinical decision-making and coordinating patient care. There was also some use of the data and information collections for CQI purposes, particularly evident in three of the four services (Table 7).

The extent to which the services used their data and information depended on the quality of their collections and several service factors. As shown in Table 7, there were incomplete records of the care of patients with diabetes and differences in how and where information was recorded in the medical files. The four services appeared to record items such as height, BP and glycosylated haemoglobin according to the recommended guidelines endorsed by Diabetes Australia and the RACGP. However, records for weight, waist circumference, BMI, eye examinations and foot checks were incomplete.

The quality of the collections not only limited the extent to which the services could evaluate their performance against business plans and strategic plans, but also the extent to which they could monitor and evaluate their clinical care systems and patient outcomes and engage in CQI activities.
Research Question 3: What service factors affected the management of data and information?

The service factors which affected the management of data and information within the services included their past experiences, funding arrangements, organisational structure and decision-making processes, IT system and the capacity and capability of their workforce.

Past experiences and funding arrangement

The past experiences of the services affected their management of data and information. Some services, particularly the ACCHS and CHS, were more familiar with the process than the others.

As demonstrated in Table 8, the ACCHS and CHS were required, due to their funding contractual arrangements, to report regularly on their service activity to government departments such as OATSIH and Queensland Health. Because it directly influenced their level of annual funding, these services recognised the importance of data and information management. On the other hand, the general practices, receiving the bulk of their funds from HIC claims and from patients, had minimal reporting requirements.

The funding arrangement of the services also determined the degree to which governments were able to influence the services’ internal systems and processes, such as the implementation of the EMPHC, IT systems and frameworks to monitor service performance and patient outcomes for CQI. As previously shown, the government-funded services were encouraged to implement CQI activities, such as the CIP and the Healthy for Life program. However, the general practices’ engagement with similar initiatives, such as NQPS and NPCC, was voluntary.

Organisational structure and decision making process

The organisational structures and decision-making processes affected the management of data and information because they were developed around manual-based structures and processes which had been slow and inefficient. The introduction of IT systems increased the services’ capacity to manage data and information. For example, the IT systems supported electronic messaging, which increased the speed of information flow and increased access to senior managers. The systems also supported networking among
staff from different program areas or services. However, there appeared to be selective use of the IT systems and little adjustment to the services' internal systems and processes to reflect this potential for change.

As demonstrated in each of the case study chapters, the services' organisational structures were hierarchical, involving several managerial levels and a number of different people at each of those levels. As shown in Table 8, the decision-making process appeared to follow the lines of authority, based, in turn, on each service's organisational structure: information was passed along a chain from operational staff through several line managers. This was time-consuming and inefficient, particularly for the larger services, such as the ACCHS and the CHS (which is part of a much bigger organisation, Queensland Health). However, similar problems were also emerging within the general practices due to their increased size.

The limited adjustments to internal systems and processes to reflect the impact of the IT systems increased staff workload and created data and information management practices which were not conducive to the needs of the services.

**IT systems**

The use of IT systems increased the capacity of the services to manage their data and information. As shown in Table 8, IT systems were present in all four services. The patient information systems included *Medical Director, Ferret, Genie* and *IBA Plexus*. The systems supported appointment bookings, billing, clinical record-keeping, clinical guidelines, recall and reminder prompts, electronic messaging, letter and prescription writing, automatic downloads of pathology results and patient health education resources. The systems also supported data and information reporting for clinical and service population planning and evaluation.

However, the use of the systems was affected by the degree to which they supported the needs of the particular service. For example, some systems supported internal electronic messaging and automatic recall and reminder prompts, but others did not. There was little electronic sharing of patient data and information, due not only to adherence to the NPP, but also because the different systems were technically unable to link with one another. There also appeared to be difficulties in trying to modify the systems within a
timely manner to reflect changes within and external to the service, for example, the implementation of the diabetes ACC templates or changes to clinical guidelines.

The use of the systems was also affected by the competence of staff in data and information management and IT use and inadequate use of protocols or guidelines to ensure a consistent approach. There also appeared to be little training or professional development activities regarding data and information management and IT use.

These difficulties appeared to stem from inadequate involvement of the services in the design, implementation and application of the IT systems they were using; insufficient adjustment of internal systems and processes to support their use of the IT systems; and inadequate funding allocated by each of the services to IT.

**Capacity and capability of workforce**

As demonstrated in Table 8, formal and informal training initiatives were provided to the GPs and the staff. However, there appeared to be varying degrees of competence among the services' workforce and limited training and professional development opportunities in data and information management and IT use.

The knowledge and skills base within the services affected their capacity to manage data and information to support their care of patients with diabetes as well as the degree to which they engaged in local health service planning and development and CQI activities. As demonstrated in Table 8, the increased requirement for government-funded services to monitor the performance of their clinical care systems and their patient outcomes resulted in these services obtaining assistance from experts based in external organisations. Similar activities were also emerging within the private practices with support obtained from their local Division.

The level of training and professional development in data and information management and IT use was also affected by the level of access to qualified trainers and experts, which appeared to be insufficient, and also by the services' investment in these activities. As illustrated in the case studies, funding was required to provide the training and professional development activities and to employ relief staff to allow the services' workforce to attend these activities during business hours.
Research Question 4: What are the implications of my findings for primary health care policy and practice?

The impact of chronic diseases both globally and in Australia, to individuals, to their attending clinicians, to the provision of health care services and to the financing of health care has resulted in increased calls for more effective systems of care and improved performance of Australia’s health care systems. A key component of this process is the effective management of information resources.

The federal and state governments have recognised the importance of the use of data and information management and IT in reforming the health agenda. Both levels of government are investing in advancing the electronic management of health information (e-health) to deliver safer, more efficient, and better quality health care. This has involved the establishment of several government and non-government health information and e-health structures, such as the National Health Information Group, the Australian Health Information Council, the Heath Data Standards Committee, the Statistical Information Management Committee, the National Advisory Group on Aboriginal and Torres Strait Islander Health Information and Data and the National Public Health Information Working Group. Health informatics groups, e-health initiatives such as HealthConnect and the Broadband for Health Program and data and information management education and training courses, have also emerged recently.

This study attempts to describe the processes involved in the care of patients with chronic diseases and in the management of data and information and has demonstrated that these processes were emerging within the PHC services studied. However, the findings indicate that there are several factors that have limited the PHC services capacity to manage data and information effectively in order to support the care of patients with chronic diseases.

This study therefore raises further questions, such as:

- Which service factors are best resourced and funded to produce the greatest yield in improving data and information management and IT use? and
- What is the best way to support PHC services to improve their capacity in the management of data and information and their use of IT?
The approaches adopted by the National Health Service (NHS) in the United Kingdom and Queensland Health may provide some answers to these questions.

In the United Kingdom (UK), primary care trusts (PCT) manage the delivery of primary health care services such as general practice, community and practice nursing, physiotherapy, occupational therapy, pharmacy, optometry, dentistry and midwifery. The trusts are responsible for 80 percent of the total NHS budget. They are free-standing NHS organisation with their own boards, staff and budgets. They are monitored by their local strategic Health Authority (SHA) and are accountable to the Secretary of State for Health [131]. PCT work with other health and social care organisations and local authorities, they provide some care directly and commission services from others, such as NHS acute trusts and private providers.

The NHS general practices were mostly computerized by the mid-1990s and a large number of practices were unofficially creating electronic records for their patients. Similar to GP practices in this study, the emergence of IT in the NHS general practices was primarily due to subsidies; they were supplied by different providers and were also incompatible with each other [132].

The modernization of the NHS was initiated in the late 1990s and resulted in the world’s largest investment in IT with the NHS committing £12.4 billion over 10 years to improve services and quality of patient care through the strategic use of IT [136]. The NHS National Programme for IT, through the NHS Connecting for Health, aimed to create the most comprehensive electronic health records infrastructure of any health care system by connecting 30,000 general practices and 270 acute, community and mental health trusts to a single, secure, national system in order to make information available when and where it is needed, including to patients themselves. The key elements of the NHS Connecting for Health include NHS care records service [59], choose

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58 Reference 133 to 136
59 NHS Care Records Service – Goal is to ensure that patient information is available electronically to professionals providing care, wherever and whenever treatment is occurring.
and book, electronic prescribing, QMAS (Quality Management and Analysis System), picture archiving and communication system (PACS), and secure clinical communication email service.

The NHS has adopted an approach where the organisation’s mission, ‘to bring excellence to life’ is reflected in all aspects of the organizations from its business domain, through to the application systems, technologies, and management of data and information. For example, to ensure the right person receives the right information at the right time to make the best decision, the NHS has proposed a national, central database called Spine. Spine ‘acts like a single, big electronic telephone exchange. It takes ‘calls’ and puts them through to the right section for ‘callers’ to get the information they require.’ It is anticipated when the system is fully implemented, local records will automatically upload important information to the summary patient record on Spine and this information will be accessible to authorized users such as clinicians or to secondary users, where anonymised data can be generated for business reports and statistics for research and planning purposes.

The approach adopted by the NHS has and continues to be quite an ambitious attempt to strategically manage data and information whilst also navigating the complexities of the health system and the IT domain. The NHS has delivered on implementing the first stage of the Choose and Book initiative, however Cross (2006) and Coiera (2007) have highlighted a number of challenges for the implementation of the rest of the programme [132, 137]. These include cost overruns, delays and growing clinical unrest.

A similar approach to strategically managing data and information to improve health outcomes has also been adopted by Queensland Health. In 2005 the department invested

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60 Choose and Book – General practices will be able to book outpatient appointments for their patients online.
61 Electronic prescribing – Prescriptions generated by doctors will be sent to a patient’s preferred pharmacy via the internet.
62 QMAS – Measures how well a practice is doing in relation to guidelines set out by the new GP (GMS II) contract.
63 PACS – Will allow images to be incorporated into a patient’s electronic record.
64 Secure clinical communication email service – To enable clinicians to relay information and queries between members of the healthcare professions.
$4 million over 12 months to upgrade its IT management structure, processes and systems in an attempt to support the delivery of high quality health care. The restructure involved three major programs: the Transformation Program aimed to align the organization to the needs of the public health community; the ICT Investment Office aimed to ensure all investments were aligned to Queensland Health’s strategic objectives; and the ICT Delivery Office aimed to ensure the ICT initiatives met the needs of health care providers. The department has also recently published an e-Health strategy that provides their vision to enabling ‘a patient-centric focus to health care delivery across a networked model of care.’ As such, the design and implementation of information systems and processes will be centred on the patient and focused on equipping clinicians and other care providers across the health care system with relevant, comprehensive and accurate information.

The approach adopted by the NHS and Queensland Health may provide a framework for primary health care services in Australia to strategically manage their data, information and IT. However, there are several factors that may limit uptake of this approach by the services. The most obvious of these is cost. As highlighted, the NHS and Queensland Health have invested significant resources into restructuring their health systems. However, for most PHC services such an expense would require government support given the difficulty experienced by these services in trying to maintain their IT systems. The different funding models for PHC services and the associated contractual arrangements also detract from a strategic approach to data and information management. As demonstrated, government funded services are required to report against parameters that may differ from their goals and objectives and may also differ to other funding streams they are receiving, for example HfL and SAR.

The other major challenge for primary health care services in Australia is their differences in governance arrangements. The UK primary care trusts and the state and territory government PHC services are governed by an overarching authority however this is not the case in the ACCHS and GP sector. The lack of an overarching strategy or agreement between PHC services limits the effectiveness of the sector in trying to strategically manage data, information and IT for improved health outcomes. As highlighted by Coeira, Australia’s local systems have agreed to confirm to national
standards promulgated by NeHTA. However, trying to adopt an approach similar to the NHS is hindered by Australia’s federal structures, which allows each state and territory its own procurement process, financial and regulatory framework and controls. These difficulties are highlighted in the following correspondence from a representative of NeHTA.

NEHTA is currently exploring the issue of interoperability and primary care as part of its efforts to more effectively utilise the primary care entry point for patients. There are many challenges covering all interoperability perspectives through business, information, and technical. Specifically we need to obtain agreement on a basic set of primary care functions and associated business processes representing semi-consistent or at least known behaviours. For instance patient identification processes are highly variable (as are referral follow-up, etc). There is also variability in the data flows and content into and out of primary care with many message/document forms being highly customised to particular business relationships. We are actively working to create constrained information forms which will narrow the scope of variability. Finally there is a challenge with technical capability and technology use. The basic security of data at rest as well as data in transit is not consistent and the various connectivity approaches employed require relatively unique and highly coupled solutions (be that to a particular service provider or technology). Unfortunately I have no easy answers for you and cannot point you at any particular site for expert advice on these matters.

The implementation of the national IM&ICT strategy and the national e-Health strategy is a step towards providing an overarching strategy for PHC services. However, given this study's findings, there is a possibility that this and other data and information management strategies and policies have not been suitably tailored to the needs of PHC services and were not effectively implemented. As such, the PHC sector needs to develop an IM&ICT agenda, policy and strategy that aligns to the national approach, is specific to the needs of individual services and describes the approach to which the sector’s information resources are to be maintained, managed, and applied in order to achieve quality health care and improve health outcomes [14].

There also needs to be a coordinated and strategic approach to PHC representation at the national and state level. The current representation involves a number of individual
organisations, such as the General Practice Computing Group, the National Health Information Group and the Australian Health Information Council. A PHC IM&ICT representative body would strengthen the sector’s role in providing leadership and direction regarding the sector’s requirements and in ensuring a coordinated approach in the development of policy, training and professional development, research and the development and implementation of IM&ICT systems. It is also possible that such a representative body could support the PHC services in improving their data and information management systems.

Workforce capacity and capability is also an issue for PHC services. One of the lessons learnt from the NHS Connecting for Health initiative is the lack of skilled workforce in large-scale IT implementation and familiarity with health services. The effective management of data and information and IT use requires a range of skilled personnel for data stewardship programs, data quality teams; and IT governance. Many of these roles are emerging and as such the pool of skilled workforce may be small. The importance of recruiting skilled workforce and enhancing the capacity of staff is also important to initiating cultural change within PHC services. Strategies are needed to promote the importance of a whole of organization approach to strategically managing data, information and IT for improved quality of health care and patient outcomes.

The strategic management of data and information and IT use will be a formidable task for PHC services. As previously mentioned, the PHC services are seen as being best placed both to ameliorate the incidence of chronic diseases and, through more effective management, to limit their progression. With increased government emphasis and investment in the e-health agenda, the challenge for PHC services is to strategically manage the service’s information resources to support their effective care of patients with chronic diseases. This will be extremely difficult for the PHC sector given the factors presented in each of the case studies: the presence of legacy decision making processes and systems, limited use of coding standards for data entry and recording, variability in IM&IT workforce capacity, and limited information systems interoperability. For example, should policy be implemented that made it a requirement for PHC services to become paperless; a select group of PHC services may have the capacity and capability to engage with this direction. However, most would have
difficult in trying to engage with this agenda in the absence of guaranteed investment, in terms of funding (to upgrade and maintain systems; to support capacity development), expert advice and support (to allow successful management of these systems to support the core functions of the service such as clinical management), and collaboration of other health sectors that are using legacy systems (to support interoperability). Given the changes within the e-health environment, my recommendations to a PHC service would be to seek expert advice and support from an information systems analysts about what requirements will need to be implemented in order for the PHC service to effectively engage in the e-Health agenda; to allocate a significant proportion of their annual budget to information systems (includes system upgrades and maintenance and staff development); and to develop and implement regular training initiatives for management and clinical staff that covers a interdisciplinary program of clinical management, information management and IT systems.

The approaches used by other health systems and other sectors may not provide the answers or solutions to the difficulties faced. However, PHC services should reflect and build on the lessons learnt by these sectors to develop innovative approaches to improving the quality of health care. These approaches must acknowledge the complexity of PHC systems and the characteristics of its external political, social, economic and technological environment.
References:


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### Section 1 - General Information

1. Client ID
2. Date of birth
3. Sex
   - Male
   - Female
   - Not rec
4. Medicare number recorded
   - Yes
   - No
5. Audit date

### Section 2 - Diagnosis of Diabetes

6. Date of diagnosis of diabetes known
   - Yes
   - No
7. Date of diagnosis of diabetes

If the client has not attended the clinic from (---/---/--) to (---/---/--) the audit ceases here

### Section 3 - Risk factors and key summary information

8a. Smoking status
   - Yes
   - No
8b. If smoker, # of cigarettes/day recorded?
   - Yes
   - No
<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>8c. If quit, date recorded?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Level of exercise recorded?</td>
<td>Yes</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>0</td>
</tr>
<tr>
<td>10a. No. of alcoholic drinks/wk recorded?</td>
<td>Yes</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>0</td>
</tr>
<tr>
<td>10b. No. of alcohol free days/wk recorded?</td>
<td>Yes</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>0</td>
</tr>
<tr>
<td>11a. Medical summary sheet present?</td>
<td>Yes</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>0</td>
</tr>
<tr>
<td>11b. Comment on completeness of forms:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12a. Current care plan or management plan present?</td>
<td>Yes</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>0</td>
</tr>
<tr>
<td>12b. If present, are clinical goals recorded?</td>
<td>Yes</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>0</td>
</tr>
<tr>
<td>12c. If present, are self mx goals recorded?</td>
<td>Yes</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>0</td>
</tr>
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</table>

**Section 4 – Hospitalisations**

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>13a. Number of hospital admissions in that last 12 months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes related</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13b. Discharge Summary present</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>0</td>
</tr>
</tbody>
</table>
Section 5 – Recall Reminder and Referrals

14. Was recall and reminder sent?  Yes 1
   No 0

15. Date: ______________________

16a. Any referrals in the last 12 months?  Yes 1
   No 0

16b. Specify:
   Podiatrist
   Dietitician
   Opthamologist

Section 6 – Audit of diabetes patient management

<table>
<thead>
<tr>
<th>Test (Insert 24 month time period)</th>
<th>Y</th>
<th>N</th>
<th>Record</th>
</tr>
</thead>
<tbody>
<tr>
<td>17 Height (once)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Measurement</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>18 BP (within 3 mths)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Test 1</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Test 2</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Test 3</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Test 4</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>19 HbA1C (6mths)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test 1</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Test (Insert 24 month time period)</td>
<td>Y</td>
<td>N</td>
<td>Record</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>---</td>
<td>---</td>
<td>--------</td>
</tr>
<tr>
<td>Test 2</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>20 Weight (within 6 mths)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reading 1</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Reading 2</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>21 Waist circum (6 mths)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measurement 1</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Measurement 2</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>22 BMI (12 mths)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measurement 1</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>23 Eye (12 mths)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test 1</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>24 Foot check (12 mths)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Check 1</td>
<td>1</td>
<td>0</td>
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</tr>
<tr>
<td>25 BGL / BSL (12 mths)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Test 1</td>
<td>1</td>
<td>0</td>
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Additional Notes:
Table 6. Systems of care of patients with diabetes present in four PHC services (2007).

<table>
<thead>
<tr>
<th>Multidisciplinary Team Approach</th>
<th>ACCHS</th>
<th>CHS</th>
<th>GP Rural</th>
<th>GP Urban</th>
</tr>
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<tbody>
<tr>
<td><strong>Team Members</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reception team</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>GPs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RNs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AHWs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visiting specialists</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specialists based in external services</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ophthalmologist</td>
<td>97%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Endocrinologist</td>
<td>37%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes educator</td>
<td>6%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dietician</td>
<td>12%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Podiatrist</td>
<td>12%</td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Referrals (Findings from chart audit – proportion of diabetes patients referred to a diabetes specialist within a 24 month period)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ophthalmologist</td>
<td>97%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Endocrinologist</td>
<td>37%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes educator</td>
<td>6%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dietician</td>
<td>12%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Podiatrist</td>
<td>12%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ophthalmologist</td>
<td>35%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Team Meetings</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meetings held between GP and</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meetings held within CHS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Meeting</strong></td>
<td></td>
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<td></td>
<td></td>
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</table>

201
<table>
<thead>
<tr>
<th></th>
<th>ACCHS</th>
<th>CHS</th>
<th>GP Rural</th>
<th>GP Urban</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AHW from the ACCHS chronic disease clinic</td>
<td>Communication facilitated by CHS chronic disease program via emails, telephone discussions, letters and informal discussions</td>
<td>individual staff member or specialist</td>
<td>individual staff member or specialist</td>
</tr>
<tr>
<td></td>
<td>Communication facilitated by internal email system, referral letters, telephone discussions and informal discussions</td>
<td>Limited number of meetings involving whole multidisciplinary team</td>
<td>Communication between multidisciplinary team facilitated by triage officer, referral letters, telephone and informal discussions</td>
<td>Communication facilitated by internal email system, referral letters, telephone discussions and informal discussions in tea room</td>
</tr>
<tr>
<td></td>
<td>Few case conferences</td>
<td>Limited number of meetings involving whole multidisciplinary team</td>
<td>Limited number of meetings involving the whole multidisciplinary team</td>
<td>Limited number of meetings involving the whole multidisciplinary team</td>
</tr>
<tr>
<td></td>
<td>Limited number of meetings involving the whole multidisciplinary team</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clinical Guidelines</td>
<td>Endorse the use of clinical guidelines developed in partnership with Queensland Health</td>
<td>Endorse the use of clinical guidelines developed by Queensland Health and Royal Flying Doctor Service</td>
<td>Endorse the use of clinical guidelines developed by Diabetes Australia and RACGP</td>
<td>Endorse the use of clinical guidelines developed by Diabetes Australia and RACGP</td>
</tr>
<tr>
<td></td>
<td>Guidelines available on the desktop of each computer and in hard copy format</td>
<td>Limited use of guidelines by chronic disease program</td>
<td>Limited use of guidelines</td>
<td>Limited use of guidelines</td>
</tr>
<tr>
<td></td>
<td>Limited staff awareness and use of guidelines in clinical practice</td>
<td>Refer to GPMP</td>
<td>Refer to diabetes annual cycle of care recommendations</td>
<td>Refer to diabetes annual cycle of care recommendations</td>
</tr>
<tr>
<td>Disease Register</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type</td>
<td>ACCHS</td>
<td>CHS</td>
<td>GP Rural</td>
<td>GP Urban</td>
</tr>
<tr>
<td>-----------------</td>
<td>----------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
<td>--------------------------------------------------------</td>
<td>--------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>Paper based registers</td>
<td>Paper registers</td>
<td>Paper registers</td>
<td>Patient registers</td>
</tr>
<tr>
<td></td>
<td>Based on patient lists</td>
<td>Based on patient lists</td>
<td>Based on patient lists</td>
<td>Based on patient lists</td>
</tr>
<tr>
<td></td>
<td>generated from the electronic patient information system</td>
<td>generated from the electronic patient information system</td>
<td>generated from the electronic patient information system</td>
<td>generated from the electronic patient information system</td>
</tr>
<tr>
<td>Use</td>
<td>Monitor medicare billing and update contact lists</td>
<td>Identify patients registered with NDSS and eligible for specialist</td>
<td>Monitor medicare billing and update contact lists</td>
<td>Monitor medicare billing and update contact lists</td>
</tr>
<tr>
<td></td>
<td>Identify diabetes patients, and</td>
<td>outreach appointments, and</td>
<td>Identify patients eligible for EPC, and</td>
<td>Identify patients eligible for EPC, and</td>
</tr>
<tr>
<td></td>
<td>Implement specific health strategies such as CIP</td>
<td>Implement specific health strategies such as group education classes</td>
<td>Implement specific health strategies such as group</td>
<td>Implement specific health strategies such as group</td>
</tr>
<tr>
<td>Quality</td>
<td>Register used for this study’s chart audit listed patients with</td>
<td>Register used for this study’s chart audit listed patients with</td>
<td>Register used for this study’s chart audit listed</td>
<td>Difficulty in trying to maintain the registers due to</td>
</tr>
<tr>
<td></td>
<td>different diabetes diagnoses,</td>
<td>different diabetes diagnoses,</td>
<td>different diabetes diagnoses,</td>
<td>limited understanding among staff</td>
</tr>
<tr>
<td></td>
<td>regular clients, deceased</td>
<td>regular clients, deceased</td>
<td>regular clients, deceased</td>
<td>regarding the importance of the registers; tedious</td>
</tr>
<tr>
<td></td>
<td>patients and patients who had</td>
<td>patients and patients who had</td>
<td>patients and patients who had</td>
<td>task</td>
</tr>
<tr>
<td></td>
<td>not been to the service within the last 24 months.</td>
<td>not been to the service within the last 24 months.</td>
<td>not been to the service within the last 24 months.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>
## Follow up and review

**Facilitated by:**

<table>
<thead>
<tr>
<th>ACCHS</th>
<th>CHS</th>
<th>GP Rural</th>
<th>GP Urban</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPMP</td>
<td>Private GP - The private GP sent a referral letter instead of a recall and reminder letter to the chronic disease program. I was unable to assess the number of recalls as I did not have approval to access the private GP’s medical files</td>
<td>Diabetes annual cycle of care process</td>
<td>Electronic recall and reminder system,</td>
</tr>
<tr>
<td><strong>Electronic recall and reminder system</strong></td>
<td><strong>Electronic recall and reminder system but only for pathology tests.</strong></td>
<td><strong>Electronic recall and reminder system</strong></td>
<td>Annual cycle of care process, and</td>
</tr>
<tr>
<td><strong>Present in 38% of audited medical files</strong></td>
<td><strong>Present in 64% of audited files</strong></td>
<td><strong>Present in 16% of audited medical files</strong></td>
<td><strong>Present in 50% of audited medical files</strong></td>
</tr>
</tbody>
</table>

**Recall and Reminder**
- **Present in 38% of audited medical files**
- **Present in 64% of audited files**
- **Present in 50% of audited medical files**
- **Present in 50% of audited medical files**
- **Present in 46% of audited files**
- **Absent**

**Flow Charts and Review Charts**
- **Absent**
- **Present but incomplete and information was not current**
- **Absent**

**Baseline reporting**

**Purpose**
- **Administrative purposes – fulfilling reporting requirements**
- **Administrative purposes – fulfilling reporting requirements**
- **As part of practice accreditation and for local divisions of GP**
- **As part of CQI activities such as practice accreditation and**

---

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<table>
<thead>
<tr>
<th>Patient factors</th>
<th>Facilitated by:</th>
<th>ACCHS</th>
<th>CHS</th>
<th>GP Rural</th>
<th>GP Urban</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>to senior managers and the board</td>
<td>to senior managers</td>
<td>Home blood glucose monitoring, and</td>
<td>Diabetes educator service</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reports included number of patient presentations, episodes of care, reason for presentation</td>
<td>Reports included number of patient presentations, episodes of care, reason for presentation</td>
<td>Group education classes, and Providing NDSS support</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clinical purposes – as part of CQI activities such as CIP included chart auditing, process mapping, and systems assessment.</td>
<td>Clinical purposes – for senior management use to monitor the performance of the service and its clinical programs. Obtained data from chart auditing and from the Ferret system.</td>
<td>Home blood glucose monitoring, Group education classes, and 24 hour blood pressure monitoring</td>
<td>NPCC</td>
</tr>
<tr>
<td>Processes and flows</td>
<td>ACCHS</td>
<td>CHS</td>
<td>GP Rural</td>
<td>GP Urban</td>
<td></td>
</tr>
<tr>
<td>--------------------</td>
<td>-------</td>
<td>-----</td>
<td>----------</td>
<td>----------</td>
<td></td>
</tr>
<tr>
<td>Components</td>
<td>Administrative and clinical staff in the ACCHS; visitors and others based in external services</td>
<td>Administrative and clinical staff in the CHS; private GP clinic; visitors and others based in external services</td>
<td>Administrative and clinical staff in the private GP rural practice and visitors. Limited involvement of external services.</td>
<td>No process map was developed for this site</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Paper information systems – paper medical file</td>
<td>Paper information system – paper medical file</td>
<td>Paper information systems – paper medical file</td>
<td>From observations, interviews and informal discussions it appears the components involved:</td>
<td></td>
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<tr>
<td></td>
<td>Electronic information system – Medical Director and Ferret</td>
<td>Electronic information system – Ferret</td>
<td>Electronic information systems – Genie</td>
<td>Administrative and clinical staff in the private GP urban practice and visitors. Limited involvement of external services</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Complex interaction</td>
<td>Complex interaction</td>
<td>Complex interaction</td>
<td>Loops - recall and reminder process</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Loops – request for pathology test through to receiving the results</td>
<td>Loops – referral process from private GP through to CHS</td>
<td>Loops – request for pathology test through to downloading the result</td>
<td>Dead ends – information from specialists</td>
<td></td>
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<tr>
<td></td>
<td>Dead ends – paper medical file</td>
<td>Dead ends – information sent to external services</td>
<td>Dead ends – Genie information system</td>
<td>Gaps – document scanned into the wrong file</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Gaps and duplications – patient receives two notices to return for the same recall</td>
<td>Gaps and duplications – information flow from the GP to the CHS</td>
<td>Gaps and duplications – when information was not forwarded to other GPs within the practice when the managing GP was unavailable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data and Information management guidelines</td>
<td>Collection</td>
<td>Involved:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>------------</td>
<td>-----------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ACCHS</strong></td>
<td>Guidelines</td>
<td>NPP and ACCHS policy and procedure regarding data and information management</td>
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<tr>
<td><strong>CHS</strong></td>
<td>Collection</td>
<td>See processes and flows - components</td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>GP Urban</strong></td>
<td>Collection</td>
<td>See processes and flows - components</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Completeness of diabetes information recorded in 50 diabetes patient medical files. (Findings from this study's chart audit)</strong></td>
<td>Involved:</td>
<td>All staff record data into IBA Plexus</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>ACCHS</strong></th>
<th><strong>CHS</strong></th>
<th><strong>GP Rural</strong></th>
<th><strong>GP Urban</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical summary sheet – present in all charts</td>
<td>Medical summary sheet – present in all charts</td>
<td>Medical summary sheets – present in all files</td>
<td>Medical summary sheet – present in all files</td>
</tr>
<tr>
<td>Height - 70%</td>
<td>Height - 88%</td>
<td>Height - 84%</td>
<td>Height - 68%</td>
</tr>
<tr>
<td>BP - 75%</td>
<td>BP - 67%</td>
<td>BP - 75%</td>
<td>BP - 66%</td>
</tr>
<tr>
<td>HbA1c - 77%</td>
<td>HbA1c - 84</td>
<td>HbA1c - 86%</td>
<td>HbA1c - 83%</td>
</tr>
<tr>
<td>Weight - 71%</td>
<td>Weight - 58%</td>
<td>Weight - 56%</td>
<td>Weight - 43%</td>
</tr>
<tr>
<td></td>
<td>ACCHS</td>
<td>CHS</td>
<td>GP Rural</td>
</tr>
<tr>
<td>-------------</td>
<td>-------------------------------------------</td>
<td>------------------------------------------</td>
<td>-----------------------------------------</td>
</tr>
<tr>
<td>Waist</td>
<td>nil</td>
<td>36%</td>
<td>1%</td>
</tr>
<tr>
<td>BMI</td>
<td>26%</td>
<td>64%</td>
<td>75%</td>
</tr>
<tr>
<td>Eye check</td>
<td>26%</td>
<td>46%</td>
<td>30%</td>
</tr>
<tr>
<td>Foot check</td>
<td>40%</td>
<td>54%</td>
<td>30%</td>
</tr>
<tr>
<td>Differences</td>
<td>in where and how information was recorded</td>
<td>in where and how information was recorded</td>
<td>in where and how information was recorded</td>
</tr>
<tr>
<td></td>
<td>within the medical file</td>
<td>within the medical file</td>
<td>within the medical file</td>
</tr>
<tr>
<td>Storage</td>
<td>Paper medical file and electronic patient</td>
<td>Paper medical file then re-enter data</td>
<td>Electronic medical file – Genie</td>
</tr>
<tr>
<td></td>
<td>information systems – Medical Director</td>
<td>into electronic medical file – Ferret</td>
<td>Archived paper medical files</td>
</tr>
<tr>
<td></td>
<td>2005 – shift to paper less system</td>
<td></td>
<td>Scanned hard copy documents into</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>electronic medical file</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Access</td>
<td>Restricted to ACCHS employees</td>
<td>Restricted to authorised Queensland</td>
<td>Restricted to private GP staff</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Health employees. Protocols in place to</td>
<td>and visiting health professionals</td>
</tr>
<tr>
<td></td>
<td></td>
<td>allow patient access to medical files</td>
<td>Protocols in place to allow patient</td>
</tr>
<tr>
<td></td>
<td></td>
<td>and disclosure of information to</td>
<td>access to medical files and disclosure</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>of information to third parties</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th></th>
<th>ACCHS</th>
<th>CHS</th>
<th>GP Rural</th>
<th>GP Urban</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Paper medical file</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>third parties</td>
<td>third parties</td>
<td></td>
<td>third parties</td>
</tr>
<tr>
<td></td>
<td>Paper medical files</td>
<td>Paper medical files</td>
<td>Archived paper medical files</td>
<td>Archived paper medical files</td>
</tr>
<tr>
<td></td>
<td>monitored by the</td>
<td>monitored by the</td>
<td>monitored by the practice</td>
<td>monitored by the practice</td>
</tr>
<tr>
<td></td>
<td>reception team</td>
<td>reception team</td>
<td>practice managers and reception team</td>
<td>practice managers and reception team</td>
</tr>
<tr>
<td><strong>Electronic medical file</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Electronic medical</td>
<td>Electronic medical</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>files protected by</td>
<td>files protected by</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>passwords and</td>
<td>passwords and</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>usernames</td>
<td>usernames and</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Electronic medical</td>
<td>Electronic medical</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>files monitored by</td>
<td>files monitored by</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Q Health IT provider</td>
<td>Q Health IT provider</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Restricted access</td>
<td>Restricted access</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>within electronic</td>
<td>Restricted access</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>medical files</td>
<td>medical files</td>
<td></td>
</tr>
<tr>
<td><strong>Analysis</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>IT system has an analysis and reporting function</strong></td>
<td>MD - limited</td>
<td>Ferret - yes</td>
<td>Genie - yes</td>
<td>IBA Plexus – yes, but complex</td>
</tr>
<tr>
<td><strong>Involved</strong></td>
<td>A select group of ACCHS staff</td>
<td>Super users</td>
<td>Managing GP</td>
<td>Principal GP, practice managers, community RNs</td>
</tr>
<tr>
<td></td>
<td>Assistance received</td>
<td>Analysis also performed by</td>
<td>Assistance received from local divisions of GP</td>
<td>Assistance received from external organisations such as University of Queensland, local divisions of GP</td>
</tr>
<tr>
<td></td>
<td>from external</td>
<td>Queensland Health staff based in the district office</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>organisations such as</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Queensland Health</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use</td>
<td>ACCHS</td>
<td>CHS</td>
<td>GP Rural</td>
<td>GP Urban</td>
</tr>
<tr>
<td>----------------------------</td>
<td>------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Administrative</td>
<td>Patient billing, business administration, reports to funding bodies</td>
<td>Patient billing, reports to senior managers</td>
<td>Patient billing, monitor the budget, development of proposals</td>
<td>Patient billing, monitoring the budget, and</td>
</tr>
<tr>
<td>Clinical</td>
<td>Support clinical management, assist clinical decision-making, and coordinate patient care</td>
<td>Support clinical management, monitor the performance of the CHS, and</td>
<td>Support clinical management, assist in clinical decision-making, and coordinate patient care</td>
<td>Support clinical management, clinical decision-making, and coordinate patient care</td>
</tr>
<tr>
<td>Other</td>
<td>Some use for research</td>
<td>Local health service planning</td>
<td>Use by local divisions of GP</td>
<td>Research project</td>
</tr>
<tr>
<td></td>
<td>Increased use for CQI purposes with involvement in initiatives such as CIP</td>
<td></td>
<td></td>
<td>CQI purposes such as NPCC</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Local health service planning</td>
</tr>
</tbody>
</table>
Table 8. PHC service factors that affected the management of data and information (2007).

<table>
<thead>
<tr>
<th>Past experience</th>
<th>ACCHS</th>
<th>CHS</th>
<th>GP Rural</th>
<th>GP Urban</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Data and information sent to external organisations as part of reporting requirement</td>
<td>Data and information forwarded to district health office for administrative purposes and for senior management to monitor the performance of their health services</td>
<td>Practices involved in the amalgamation were partially computerised – retained two paper medical files and an electronic medical file</td>
<td>Smaller GP practices that amalgamated with the private GP urban practice: run by one or two GPs; primarily used data and information to support administrative functions (patient billing) and clinical functions (record keeping); mostly using paper based information systems; familiar with CQI but not for monitoring the performance of clinical care</td>
</tr>
<tr>
<td></td>
<td>External organisation analysed and interpreted data and information</td>
<td>Feedback from line managers about report outcomes were received in a negative manner</td>
<td>These practices primarily used their data and information collections for administrative and clinical purposes</td>
<td>Private GP urban practice aware of the difficulties experienced by smaller practices and the challenges posed by younger generation of GP</td>
</tr>
<tr>
<td></td>
<td>Limited feedback provided to ACCHS regarding reporting outcomes apart from changes to level of core funding</td>
<td>Belief that this feedback was inappropriate as the reports were based on Ferret data and information collections that were incomplete</td>
<td>The practices were familiar with CQI eg, practice accreditation and aware of broader system changes</td>
<td>Strategic approach to change involving system drivers such as practice managers</td>
</tr>
<tr>
<td></td>
<td>Increased feelings of distrust within ACCHS sector regarding data and information management</td>
<td>CHS advised district office of reporting differences but appeared to receive limited feedback from senior management</td>
<td>Once amalgamated with private GP rural practice – increasing involved in new initiatives (EPC and MAHS)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Increase in the prevalence of chronic disease associated with increased emphasis on improving health outcomes and improving the quality of health care - changes to models of reporting increased focus on monitoring the performance of clinical care within a CQI framework</td>
<td>Engagement in activities that monitored clinical performance - limited by staff capacity</td>
<td>Engagement in activities that monitored clinical performance - limited by staff capacity</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Changes associated with limited</td>
<td>Sought assistance from local divisions of GP</td>
<td>Sought assistance from local divisions of GP</td>
<td></td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Service funding arrangement</th>
<th>ACCHS</th>
<th>CHS</th>
<th>GP Rural</th>
<th>GP Urban</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core funds</td>
<td>Funded by the Department of Health and Ageing, through OATSIH</td>
<td>Funded by the state government via the Queensland Health department</td>
<td>Received the majority of income from patient out of pocket expenses and medicare claims.</td>
<td>Received the majority of its income from patient out of pocket expenses and medicare claims.</td>
</tr>
<tr>
<td>Reporting requirements due to funding arrangement present</td>
<td>Yes - annual reports to OATSIH regarding the activities of the service activity (eg, SAR, SDRF)</td>
<td>Yes – reports to district office and senior management team</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Service structure and decision making process</td>
<td>Hierarchical in structure consisting of three branches</td>
<td>Hierarchical in structure and consisting of several branches.</td>
<td>Hierarchical in structure</td>
<td>Describes itself as a network but appears hierarchical in structure</td>
</tr>
<tr>
<td>Structure levels</td>
<td>ACCHS</td>
<td>CHS</td>
<td>GP Rural</td>
<td>GP Urban</td>
</tr>
<tr>
<td>------------------</td>
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<td>----------</td>
</tr>
<tr>
<td>Top management to operational level:</td>
<td></td>
<td></td>
<td></td>
<td>Top management to operational level:</td>
</tr>
<tr>
<td>Board, CEO, Senior management team (EO, finance manager), Program managers, and Operational staff (reception team, AHW, RNs, enrolled nurses)</td>
<td></td>
<td></td>
<td></td>
<td>Principal owner</td>
</tr>
<tr>
<td>Followed the lines of authority</td>
<td></td>
<td></td>
<td></td>
<td>Board of GPs</td>
</tr>
<tr>
<td>Uncertainty regarding this process</td>
<td></td>
<td></td>
<td></td>
<td>Practice managers</td>
</tr>
<tr>
<td>Limited communication between the board and operational staff</td>
<td></td>
<td></td>
<td></td>
<td>Operational staff (reception team, AHW, RNs)</td>
</tr>
</tbody>
</table>

| Decision making | | | | Operational staff reported to practice managers (PM) |
| Followed the lines of authority | | | | PM addressed requests or forwarded them to principal GP |

| IT systems | Present | Investment | | |
|------------|---------|------------|----------|-----------------
<p>| | Yes – MD and Ferret | Grant from OATSIH for initial set | | IBA Plexus |
| | Yes – Ferret (used in conjunction with paper medical files) | Funds allocated by the Queensland health department in the annual | | Annual budget for IT systems was |
| | Yes – Genie | Annual budget for IT systems was | | |</p>
<table>
<thead>
<tr>
<th><strong>ACCHS</strong></th>
<th><strong>CHS</strong></th>
<th><strong>GP Rural</strong></th>
<th><strong>GP Urban</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of Medicare funds to support system upgrades, maintenance and support</td>
<td>Investment in IT systems appears to be unplanned</td>
<td>Investment in IT system appears to be limited</td>
<td>Present</td>
</tr>
<tr>
<td>Cost of maintenance, upgrades, training and development - expensive and recurrent</td>
<td>Requires approval from district office to expend funds, for example to purchase IT hardware</td>
<td></td>
<td>Cost of maintenance, upgrades, training and development - expensive and recurrent</td>
</tr>
</tbody>
</table>

**Implementation**

- Introduced first by GP familiar with IT system, Genie, in the early 1990s
- Later received OATSIH funded patient information recall system grant - introduced new system, MD
- Began using a second electronic system, Ferret, to support electronic recall and reminder process and to support reporting
- System implemented by external IT consultant
- Transition to a paperless recording keeping system – appears to
- Ferret system introduced as a trial by Better Health Outcomes Project (BHOP) team (Queensland Health).
  - Provided onsite training to CHS staff and trained select group to be Ferret super users.
  - Limited involvement of CHS in the implementation of IT systems.
- Organised by the managing GP and undertaken by external IT consultant
- Introduced first IT system in the early 1990s
- Databases from smaller practices merged with the private GP urban practice’s main IT database
- IT system upgraded to support the growth of the service
- Implementation of IT system undertaken over a weekend – team included the practice manager, software provider, IT consultants, and electricians
- Involved a lot of planning
<table>
<thead>
<tr>
<th>Application</th>
<th>ACCHS</th>
<th>CHS</th>
<th>GP Rural</th>
<th>GP Urban</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>involve limited planning</td>
<td>Use of three systems (2 electronic and one paper)</td>
<td>Use of 2 systems - Ferret system used secondary to the paper medical files</td>
<td>Primarily uses one system - Genie</td>
</tr>
<tr>
<td></td>
<td>Mid 2005 went paperless, System networked within ACCHS but not with external services</td>
<td>Limited use of Ferret system by visiting Queensland health clinicians</td>
<td>System networked within Queensland Health but not with external services</td>
<td>System networked within the practice but not with external services</td>
</tr>
<tr>
<td></td>
<td>Technical support received from 2 services: one to support the IT hardware and the second to support the IT software.</td>
<td>System networked within Queensland Health but not with external services</td>
<td>Technical support received by local IT units and BHOP - accessed via telephone or intranet to organise a site visit</td>
<td>Genie system did not support some elements of clinical management and created more work for the practice ie, no internal electronic messaging function; limited capacity to modify the application to reflect changes in diabetes management such as waist circumference</td>
</tr>
<tr>
<td></td>
<td>Technical support received by online access, phone, email, and site visit</td>
<td>Technical support received by local IT units and BHOP - accessed via telephone or intranet to organise a site visit</td>
<td>Technical support received by telephone, site visit and online forum</td>
<td>Technical support provided by managing GP and external IT consultant and by software provider</td>
</tr>
<tr>
<td></td>
<td>Monitoring and evaluation of the system – appeared to be limited</td>
<td>Monitoring and evaluation of the system – appeared to be limited</td>
<td>Technical support received by telephone, site visit and online forum</td>
<td>Technical support provided by managing GP and external IT consultant and by software provider</td>
</tr>
<tr>
<td></td>
<td>Monitoring and evaluation of the system – appeared to be limited</td>
<td>Monitoring and evaluation of the system – appeared to be limited</td>
<td>Monitoring and evaluation of the system – performed by managing</td>
<td>Monitoring and evaluation of the system – performed by practice manager</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

215
<table>
<thead>
<tr>
<th>Capacity and capability of the workforce</th>
<th>ACCHS</th>
<th>CHS</th>
<th>GP Rural</th>
<th>GP Urban</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orientation and Induction</td>
<td>Present</td>
<td>Present</td>
<td>Present</td>
<td>Present</td>
</tr>
<tr>
<td></td>
<td>Appeared to be disorganised and ad hoc. Limited orientation to IT system</td>
<td>Appeared to be organised – included orientation to relevant policy and procedure guidelines and IT systems</td>
<td>Buddy system</td>
<td>Appeared to be organised – supervised by practice manager</td>
</tr>
<tr>
<td>Training and Professional Development</td>
<td>Formal and informal training initiatives present</td>
<td>Formal and informal training initiatives present</td>
<td>Training and professional development organised by managing GP with support from local divisions of GP</td>
<td>Training and professional development organised by practice manager and supported by local division of GP</td>
</tr>
<tr>
<td></td>
<td>GPs – organised own training</td>
<td>Formal training activities organised by the workforce unit</td>
<td>GPs – participated in regular training and professional development organised by the local division of GP – usually on the weekends</td>
<td>GPs – participated in regular training and professional development provided at night or on the weekends</td>
</tr>
<tr>
<td></td>
<td>Non-GP – training organised by senior managers. Consisted of formal training initiatives such as well and informal training activities provided during the staff meeting</td>
<td>Informal training activities provided on-site</td>
<td>Non-GP staff – practice encouraged and support staff to enrol in formal training initiatives</td>
<td>Non-GP staff – practice encouraged and supported staff to enrol in at least 1 up-skilling activity</td>
</tr>
<tr>
<td></td>
<td>Appeared to be limited training and development in data and information management</td>
<td>Training on Ferret system but limited training provided on broader areas regarding data and information management and IT use.</td>
<td>Appeared to be limited training and professional development in data and information management and IT use.</td>
<td>Training provided on the IBA plexus system</td>
</tr>
<tr>
<td></td>
<td>Access to training limited due to workforce shortages</td>
<td>Access to training limited due to workforce shortages</td>
<td>Access to training limited due to workforce shortages</td>
<td>Limitations of training: did not meet the needs of all staff; provided at</td>
</tr>
</tbody>
</table>

216
<table>
<thead>
<tr>
<th>ACCHS</th>
<th>CHS</th>
<th>GP Rural</th>
<th>GP Urban</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>IT use</td>
<td>inappropriate times; voluntary participation by non-GP staff</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Recommends more funds needed to support GP and non-GP staff</td>
</tr>
</tbody>
</table>