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Subject

Telehealth Assessment Final Report

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Title
Telehealth Assessment
Final Report

Author's Declaration

This report/proposal has been prepared in accordance with UniQuest‟s Quality Management System, which is compliant with AS/NZS ISO 9000:2000.

The work and opinions expressed in this report are those of the Authors.

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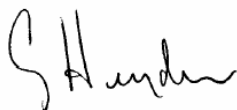Prof. Peter Croll
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GLOSSARY

ACRRM	Australian College of Rural and Remote Medicine
CME	Continuing Medical Education
COH	Centre for Online Health
CSIRO	Commonwealth Scientific Industry and Research Organisation
DBCDE	Department of Broadband, Communications and the Digital Economy
DoHA	Department of Health and Ageing
EHR	Electronic Health Record
GP	General Practitioner
ICT	Information and Communication Technologies
IP	Internet Protocol
ISDN	Integrated Services Digital Network
MSOAP	Medical Specialist Outreach Assistance Program
NEHTA	National eHealth Transition Authority
PACS	Picture Archiving and Communication System
PC	Personal Computer
RFDS	Royal Flying Doctor Service
SR	Strategic Recommendation
UQ	The University of Queensland
VC	Video Conferencing
VHA	Veterans" Health Administration

SECTION 1   EXECUTIVE SUMMARY

1.1   Introduction

In August 2010, the Australian Government made an important and significant commitment to support Medicare benefits for online consultations, in general practice and across a range of health specialties, with a specific focus on video-consultation.

In November 2010, the Department of Health and Ageing commissioned Uniquest to provide a comprehensive background document regarding telehealth implementations, with a particular focus on video-conferencing based consultations.   Uniquest represents researchers and technical experts based at, and affiliated with, the Centre for Online Health at The University of Queensland.

This report will be of interest to, and useful for individuals and organisations interested in implementing telehealth services, in particular services using videoconferencing technology.

1.2   Funding acknowledgement

This consultancy was funded by the Department of Health and Ageing.

1.3   Background

Telehealth - as a modality for delivering health services across a distance – has the potential to distribute health services more efficiently and with greater equity. Better access to health services through the use of telehealth should benefit patients living in non-metropolitan areas; provide reliable support for clinicians (including general practitioners (GPs) and nurses) working in rural and remote areas; and help ensure equity of access to healthcare for all Australians.

Telehealth refers to the delivery of health services in circumstances involving separation in location and/or time, using Information and Communication Technologies (ICT).[1] This definition has been adopted throughout this document.

1.4   Objectives

The objectives of this consultancy were to:

- Describe key Australian and international telehealth implementations including analysis of project reports and/or evaluations;
- Provide evidence from the literature regarding effective change management mechanisms and key success factors that have been shown to be effective in implementing telehealth systems; and evaluations;
- Identify issues relevant to the delivery of online (videoconference) consultations within the context described in this report;
- Report on services currently available within Australia and draw upon anecdotal evidence from clinicians and administrators responsible for such services; and
- Collate relevant reports and summarise the key factors relevant to the successful establishment and management of telehealth services.

1.5   Methodology

The consultants undertook a variety of tasks in preparing this report including a review of the international and domestic peer-reviewed, web and grey literature; consultation with key stakeholders, including peak organisations representing clinicians and the e-health / video-conferencing (VC) industry, and state and territory governments; a survey of general practitioners; and consultation with independent expert advisors. This report provides details of Australian and international experiences of telehealth including analysis of case studies, the results of stakeholder consultation and key issues related to the implementation of telehealth services.   Several recommendations for the successful implementation of telehealth using videoconsultation in Australia are also included.

1.6   Results and key findings

Telehealth around the world, and in Australia, is currently focussed on specialist consultation to patients in rural and remote locations. It concentrates on selected medical specialties, which are least compromised by the limitations associated with video-consultation. In most services, (relatively expensive) hardware video-conferencing equipment is utilised. This equipment typically complies with international telecommunication standards (referred to as standards-based-in this report) and offers a high degree of interoperability between vendors. Considerable financial support and economies of scale are required to ensure effectiveness and viability in services that use hardware-based video conferencing. For similar reasons,

many services are based in, or are associated with, hospitals. Very little information was identified in relation to general practice or personal computer (PC) based video-conferencing, most likely suggesting very low use.

1.7   Implications for relevant stakeholders

The evidence indicates that, in spite of the obvious appeal of video-consultation, and provision of suitable infrastructure, that take-up of VC has been generally low. Lack of funding for clinician time is often a barrier, but this will be overcome by the provision of a fee schedule on the Medicare Benefits Schedule (MBS). Successful VC requires education of health professionals, adjustment to administrative procedures, special scheduling and other changes to work flows and patterns.

Based on the limited experience and concerns reported in the GP survey, it is important to incorporate incentives and change management strategies to encourage the take-up of telehealth amongst these health professionals. Marketing and communication strategies should be developed once these are available.

The implementation of telehealth video consultations should be seen as an iterative process that will require a number of years of gestation before maturity will be reached. Successful implementation will depend on the development of a range of processes and capabilities, some of which will be necessary and achievable in the immediate/short-term (0 to 3 years) and others in the medium to long term (3 to 6 years). In the short-term, in some circumstances, contemporary PC and hardware based video conferencing systems may be used to provide video consultation. In the longer term the development of fully featured health teleconsultation applications that may be used anywhere that there is a PC, webcam and good broadband network access would be beneficial. These applications could be designed to meet the full requirements of clinical video consultation.

SECTION 2 SCOPE OF THE ASSESSMENT

2.1 Introduction

Telehealth - as a modality for delivering health services across a distance – has the potential to distribute health services more efficiently and with greater equity. Better access to health services through the use of telehealth should benefit patients living in non-metropolitan areas; provide reliable support for clinicians (including GPs and nurses) working in rural and remote areas; and help ensure equity of access to healthcare for all Australians.

In August 2010, the Australian Government made an important and significant commitment to support Medicare benefits for online consultations, in general practice and across a range of health specialties, with a specific focus on video-consultation.

Uniquest was commissioned by the Australian Government Department of Health and Ageing (DoHA) to provide a comprehensive background document regarding telehealth implementations, with a particular focus on video-conferencing based consultations. The aim of the project was to assess and consolidate information regarding current telehealth activities occurring across Australia as well as review international telehealth implementations.

2.2 Project objectives

Reports on relevant telehealth activities and experience relevant to the theme of the report were collated to meet the following objectives:

- Describe key Australian and international telehealth implementations including analysis of project reports and/or evaluations;
- Provide evidence from the literature regarding effective change management mechanisms and key success factors that have been shown to be effective in implementing telehealth systems; and evaluations;
- Identify issues relevant to the delivery of online (videoconference) consultations within the context described in this report;
- Report on services currently available within Australia and draw upon anecdotal evidence from clinicians and administrators responsible for such services;
- Collate relevant reports and summarise the key factors relevant to the successful establishment and management of telemedicine services.

2.3   Methodology

A systematic approach was adopted to meet the key requirements of the consultancy. Several search strategies were employed to ensure that the information described in this report reflected not only the published literature but also incorporated the grey literature (unpublished literature); informal/formal reports available via the Internet; and stakeholder opinions and current telehealth practice as reported by professional organisations such as peak body representatives and health departments within Australia. In-person interviews, telephone interviews, a web-based survey and email correspondence were used to engage with the stakeholders. Information sources (see reference list) include, but are not be limited to:

- Published reports on key telehealth implementations, both in academic peer reviewed and grey literature; evaluations of telehealth services;

- Personal contact with each Australian state and territory health department for information on telehealth related business processes, change management initiatives and unpublished evaluations;

- Personal contact with each Division of General Practice to identify any existing telehealth initiatives and an online survey of GPs (via the Divisions) and interviews with key stakeholders.

2.3.1   Literature review

The literature review was conducted to explore the published literature relating to telehealth implementations using videoconferencing (VC). The search included both peer-reviewed publications published before December 2010 and grey literature, but was limited to English language publications. The databases PubMed and Medline and the search engines Google and Google Scholar and were searched using the keywords: *telemedicine; telehealth*; *ehealth* and *videoconferencing*. In addition, the last five years of the two major international telemedicine journals, the *Journal of Telemedicine and Telecare* and *Telemedicine and eHealth* were manually searched as were all supplements of the *Journal of Telemedicine and Telecare* from 2001 to 2007 that reported proceedings of the annual Successes and Failures in Telehealth conferences. A list of websites searched and URLs are included in Appendix 1. Additionally, in an effort to ascertain telehealth work being done currently, but not published, we contacted each of the health departments in Australia for advice on telehealth activity. Documents published by the National ICT Australia (NICTA), the National E-Health Transition Authority (NEHTA) and the Department of Broadband, Communications and the Digital Economy (DBCDE) and informal correspondence were included in the review.

2.3.2   Stakeholder consultation

To provide a wide range of perspectives, opinions were sought from a range of parties with experience in telehealth, including clinicians, technologists, administrators and academics. (Table 1). A list of key stakeholders in included in Appendix 2.

Table 1: Stakeholders engaged and methods of consultation

Stakeholder Group	Method
General Practitioners	An online survey was developed and circulated to GPs via the relevant state/territory Divisions of General Practice in Australia. The survey was semi-structured with a range of questions.
Australian Government Agencies	Telephone and email conversations were held with representatives from a range of organisations including: ▪ eHealth Strategy Branch (DoHA) ▪ National ICT Australia (NICTA) ▪ National E-Health Transition Authority (NEHTA) ▪ Department of Broadband, Communications and the Digital Economy (DBCDE) ▪ Medical Benefits Review Taskforce, (DoHA) ▪ Medicare Benefits Division, (DoHA) ▪ Health Workforce Division, (DoHA) ▪ Department of Veteran Affairs (DVA)
Professional Peak Body Organisations	Telephone and email interviews: ▪ Australian Medical Association (AMA) ▪ Australian College of Rural and Remote Medicine (ACRRM) ▪ Australian General Practice Network (AGPN) ▪ Committee of Presidents of Medical Colleges (CPMC) ▪ Divisions of General Practice
State Government Health Departments	Telephone interviews were conducted with nominated representatives in each health department in Australia.
Telehealth Advisory Group (TAG)	Early discussions have been held with members of the Telehealth Advisory Group, which is led by the Medical Benefits Division.
Members of the Australasian Telehealth Society	Feedback sought through distribution of email questionnaire.

SECTION 3   ASSESSMENT RESULTS

3.1   Analysis of project materials

To inform the development of telehealth initiatives across Australia, it was appropriate to investigate the various sources of information which specifically described telehealth consultations conducted via videoconference; and telemedicine applications associated with work in general practice. This section describes a snapshot of telehealth activities reported in Australia and internationally and the results of stakeholder consultation and key issues relating to the implementation of telehealth services. Due to project time constraints, this section does not aim to provide an exhaustive list of all services available but rather to demonstrate the scope of telehealth work being performed around the world.

Telehealth (or telemedicine) refers to the delivery of health services in circumstances involving separation in location and/or time, using Information and Communication Technologies (ICT).[1] This definition has been adopted throughout this document.

3.1.1   National telehealth implementations

Telehealth activity is occurring across all Australian states and territories although the extent to which details are publicly available differs widely. Below is a summary of Australian telehealth implementations that were identified in the time available during the consultation period.

NEW SOUTH WALES (NSW)

The implementation of telemedicine began in NSW approximately 10 years ago with the formation of the Telehealth Initiative in 1996. In 2010, the NSW Telehealth Network is a state-wide network of over 240 health facilities, offering rural and remote communities of NSW increased accessibility to, and availability of services.[2] Services include paediatric, adolescent and adult mental health services; diabetes foot care; oncology; sexual health; radiology; perinatal HIV counselling; rehabilitation; chronic pain management; haematology; emergency services; surgical review; genetics services and ophthalmology.

Case examples:

▪ The Virtual Critical Care Unit (ViCCU) is an example of a telemedicine application designed for use in emergency departments. The units were developed by CSIRO in collaboration with NSW Health and staff at Katoomba Hospital, NSW. The system used a broadband internet connection based on fibre-optic cable transmitting one gigabit of data per second, thus reducing common problems such as image latency or delay in transmission.[3] Live video images and vital signs signals were transmitted from a mobile system placed next to the patient within the unit. The design facilitated real-time interaction between the resuscitation team and the remote specialist during emergency situations.[4]

▪ The Greater Southern Area Health Service (GSAHS) is using Telehealth consultations provided by its Mental Health Emergency Care Support Centres (MHECS) to support an integrated model of mental health care for both acute and primary health care services. The current capacity of the MHECS Centres Telehealth facilities covers the whole of GSAHS with Telehealth units available in 42 rural hospital sites, two units at each of the three MHECS Centres base sites, four clinical executive sites and five non clinical executive sites totalling 57 units across GSAHS.[5]

NORTHERN TERRITORY

The NT Telehealth Program was funded under the Digital Regions Initiative with a focus on the delivery of Healthcare and eLearning Services to remote Northern Territory. The funding for this project began in July 2010 therefore the project is in its infancy. However, the service is already active and it delivers telehealth services to a number of regional hospitals. The number of telehealth activities to-date is low. In terms of equipment, predominantly Polycom is used at both ends. This network is supported by the use of the Sony IP patient monitors that provide 1-way video and 2-way audio. The desktop solution uses either the public network which connects back into the NTG network via Video Border Proxy or works within the network on a point to point or multipoint basis via the bridge. There is no centralised coordination or support currently in place. While the importance of change management is appreciated, no procedures are in place. Verbal consent is obtained from the patients who are involved in telehealth. If the session is to be recorded then written consent would be required. Currently there is no formal activity record keeping system in place. The NT utilises its Shared electronic Health Record (SeHR) and an eLearning framework and an Advanced Shared Electronic Care Plan is under development. These systems will help support telehealth in the future. There are no evaluation procedures of telehealth projects or formal method of publishing the results.

Case example:

▪ The Health eTowns project will deliver improvements in health and education for predominantly indigenous populations in 17 remote towns in the Northern Territory. The project will deliver specialist healthcare services to some of the more remote indigenous communities. Video, audio and data sharing facilities to assist doctors and health professions with remote monitoring, consultation and treatment of patients will be implemented. This program does not currently involve private GPs, it is anticipated that GP‚s will be included in the program as the service evolves.

QUEENSLAND

Telemedicine services commenced in Queensland in 1995 and there are currently two main providers of telehealth services in the state: Queensland Health and the Centre for Online Health (COH) at the University of Queensland (http://www.uq.edu.au/coh). Queensland Health‚s Statewide Telehealth Services currently manages 656 videoconferencing (VC) systems across Queensland (as at 30th June 2009), 67% of which are used for clinical activity including patient consultations, case management and follow-up with the main clinical area using VC for patient care being mental health. In 2008-2009, 50,609 videoconference connections (counts both the initiating and receiving connections) were conducted, which is an increase of 33.4% from 2007/08 (Queensland Government 2009). The systems are predominantly located in public health facilities including hospitals, community health centres, Aboriginal medical services and the offices of the Royal Flying Doctor Service (RFDS) (approximately 20% of RFDS services are provided using telehealth). The majority of the units are Tandberg set-top 990 MXPs and 3000 MXP codecs and sites are increasingly migrating to IP videoconferencing rather than ISDN that may prove to be more cost-effective. A content server enables video streaming so that conferences and training can be recorded and made available on demand across the network. Additional equipment has been deployed within the bridging infrastructure to provide functionality such as ‚border control" for users who need access to the system via an external internet service provider - such as when working from home. There is also the ability to remotely manage, monitor and maintain systems performance in remote areas such as in the Torres Strait (where 15 islands have been equipped with VC equipment).[6]

The COH at the University of Queensland is based at the Royal Children‚s Hospital, Brisbane and over the past 10 years, the two groups have collaborated to develop telehealth services. Together, they have developed a centralised paediatric referral centre that is currently

available to 82 regional sites throughout Queensland and Northern NSW.[7, 8] The multidisciplinary service commenced in November 2000 and provides expert collaboration in a variety of fields including diabetes, endocrinology, burns, cardiology, dermatology, oncology, orthopaedics, gastroenterology, neurology and paediatric surgery. Between 2000 and 2010, over 11,000 teleconsultations were undertaken. Referrals are made by calling a toll-free 1800 telephone number, which provides a direct link to the duty telepaediatric coordinator. Once a referral is made, a specialist response is guaranteed within 24 hours. The telehealth coordinator liaises with the clinicians and coordinates the most appropriate response that include a return telephone call from a specialist, an email response or a consultation by VC with a specialist. Approximately 90% of all telepaediatric referrals result in a consultation via VC. Routine clinics are scheduled 12 months in advance, in a similar manner to the conventional outpatient department. Since 2008, the experience gained through telepaediatrics is being applied in the area of aged care to support the delivery of routine telegeriatric services to selected regional hospitals in Queensland.[9]

Case examples in Queensland:

▪ Multiple emergency departments in rural and regional areas are linked to a clinical coordination centres in Townsville and Brisbane, enabling more informed decisions about emergency retrievals and reducing unnecessary retrievals;

▪ Ear, nose and throat outpatient sessions are being provided to remote areas as a follow-up after surgery;

▪ Townsville to Mount Isa Intensive Care Unit (ICU) is using a combination of VC, remote vital signs monitoring, delivery of pathology and digital X-ray images to allow experienced ICU specialists in Townsville to support clinicians and patients in Mount Isa;

▪ Since May 2009, a telegeriatric service has been provided by the geriatrician at Caloundra hospital to Maryborough hospital; a similar service is being provided by the geriatrician at Cairns Base Hospital to aged care services in Innisfail, Mareeba and Cairns;

▪ A telehealth service to deliver pre-admission consultations for surgical patients living in regional areas was established at Toowoomba hospital in 2004. In 2008, the service was operating from 22 regional health services connected to Toowoomba Hospital and at that time, over 1,400 patient consultations had been conducted across a range of medical specialties. Patients attend their local health clinic where their medical history and measurements (e.g. weight, BP etc) are taken by a registered nurse which are then faxed to the anaesthetist, located at Toowoomba hospital, who completes the consultation via VC;

- Children with burn injuries may have follow up by videoconference saving a return journey back to the specialist hospital in Brisbane. Up to six telemedicine clinics are held every month. 17% of all burns outpatient appointments are now done by videoconference;

- A mobile telemedicine service has been established in the South Burnett region of Queensland to support an Indigenous community with a population of approx 3000. Clinical information is collected by an Indigenous health worker and transmitted via a secure online database for specialists in Brisbane to review asynchronously. Telemedicine ward rounds have been established for the delivery of telegeriatric services between the PA Hospital in Brisbane and selected sites in Queensland.

SOUTH AUSTRALIA

Telehealth in South Australia (SA) gained momentum in the late 1990s. Primarily telehealth work in SA involves videoconferencing for clinical and educational activities. Mental health is one of the most dominant disciplines. Telehealth concentrates on providing services from Tertiary hospitals in Adelaide to country hospitals and health centres. At present, there is no GP involvement in telehealth. It is estimated about 1800/2000 mental health consultations are conducted per year using telehealth (based on 2009 data). Telehealth equipment is purchased by individual hospitals. Therefore, equipment manufacturers may be different. A project led by the Dept of Health is underway which will upgrade equipment for hospitals. Predominantly ISDN (Telstra) is used for telehealth activities.

Currently there is no centralised coordination or management of telehealth in SA. The Department of Health ICT Services is not responsible for any coordinated activity. However, ICT Services provide some technical support to particular projects, (e.g., mental health). Overall, telehealth is coordinated by individual hospitals. From the privacy and security perspective, arrangements such as locked rooms/swipe cards are used. There is no encryption or other electronic methods used. There is no formal consent policy and patient attendance at telehealth consultations is taken as implied consent. Change management procedures are not stipulated. Telehealth sessions are not recorded. In terms of reporting, there is no centralised reporting mechanism in place. The individual telehealth project keeps their own records (e.g., to access data on mental health activity, one must contact that group.) There is also no integrated information systems used for telehealth activities. However, the mental health group keeps electronic records and those records are available for clinicians. No evaluation was reported. Several telehealth activities have reported their results. For example, the mental health group has published papers and presented in various conferences.

Case examples:

▪ Telemedicine has evolved to become an integral part of the South Australian Rural and Remote Mental Health Service. The resulting telemedicine service is one of only a few telepsychiatry services around the world that is firmly embedded in normal clinical practice and can be regarded as sustainable;

▪ Recent announcement by the Department of Broadband, Communications and the Digital Economy to fund telehealth project comprising broadband-enabled services such as medical consultations via videoconferencing, a 24/7 emergency triage system, specialist outreach services and Aboriginal mental health services.[10]

TASMANIA

The Telehealth Tasmania Network (TTN) commenced operations in 1998 and enables the support and delivery of health services via VC equipment. Telehealth uses a mix of broadband and high-speed secure digital telephone lines to enable face-to-face visual communication between patients, primary health care providers and specialists. Although there are currently 120 high definition end points (VC units) located in Department of Health and Human Services (DHSS) sites across Tasmania,[11] telehealth sites are concentrated in three main cities: Hobart in the south, Launceston in the north and Burnie in North West. These three cities are homes to two regional hospitals and a district hospital.[12] Portable, wireless based systems (consisting of lightweight trolleys, large flat screens and codecs) which can be plugged in at the patient bedside on the wards within intensive care units (ICU) and emergency departments or outpatient clinics are used. Remote patient monitoring, multi-disciplinary case reviews, tele-consultations, interstate specialist appointments and extensive clinical education programs are delivered utilising the network. Usage of the TTN encompasses all clinical disciplines.

Case example:

▪ The EchoCardiographic Healthcare Online Networking Expertise in Tasmania (ECHONET) system is a mobile system that provides high-quality VC and simultaneous video data transmission from the patient‚s bedside using the same codec as the ViCCU. Two high-quality video channels (a camera plus an external input such as a computer or ultrasound scanner) can be sent from each site and it is also possible to initiate a three-way connection. It was designed to support a range of activities that include bedside ICU consultations, echocardiography and education. All activations are user initiated (there is no on-site support) and a graphical user interface was designed to facilitate use by untrained staff. Three connected units were deployed: two in the ICUs of North West

Regional Hospital (Burnie) and Royal Hobart Hospital, respectively, and one in the Cardiology Department of Royal Hobart Hospital. A nine-month clinical trial was conducted although the volume of activity using the system was not reported.[4]

VICTORIA

The major focus of health information and technology in Victoria at present is Health*SMART* which is a major project to modernise ICT systems throughout Victoria‚s public healthcare sector.[13] It will include resource management systems, electronic patient management and clinical systems which will automate functions such as prescriptions and ordering tests. To date, telemedicine activity in rural Victoria has been driven by the Rural Health Alliances (RHAs).

Case examples:

- The Grampians Rural Health Alliance Victoria (GRHA) situated in western Victoria, commenced in 2005 and comprises 12 hospital-based health services, four bush nursing centres and several stand-alone community health centres, spread across 40 sites. It provides technology, applications and communications solutions to connect the regions health services. The service uses mobile, integrated Medilink VC units customised for this purpose. The units were based on TANDBERG technology and include integrated digital cameras and there are 17 such units in use (to date) that have been installed in emergency departments and community health centres and are being used for clinical support (e.g. they are being used to access wound care specialists and dialysis support nurses), supervision and mentoring. More than 1,200 hours of VC are conducted each quarter and is growing (e.g. VC usage for the Oct-Dec quarter 2009 increased approx 43% over the previous quarter);

- The Loddon Mallee Health Alliance is an alliance of 18 hospitals and 5 community health centres across 120 sites in Northern Victoria. The alliance has built a $10 million wide area network and all hospitals have at least 20Mbps fibre VPN connection that provides IP Tel, internet as well as VC services. One project implemented within the region is the ViTCCU project;

- The Virtual Trauma and Critical Care Unit (ViTCCU) project commenced in December 2008 and provides support for local doctors in regional Victoria (Echuca, Swan Hill and Mildura), dealing with trauma or specialist cases, by linking them via video conferencing and fast broadband equipment, with trauma and critical care specialists at Melbourne‚s Alfred, Austin, St Vincent‚s and Royal Children‚s hospitals. The VC equipment incorporating broadband technology is set up by the bed of a critically ill patient in the

regional hospital. It is able to immediately send the patient‟s vital signs, clinical test results and x-rays direct to waiting trauma specialists in Melbourne. The specialist can see the patient„s condition live via a video session and review the patient„s vital signs and are then able to offer expert treatment advice on the care of that patient.

WESTERN AUSTRALIA

Telepsychiatry began in WA in 1996 and teleradiology commenced in 2001. From 1999 - 2004, the WA Department of Health conducted a telehealth project that funded 75 videoconferencing sites (part of a total state-wide VC network of 104 sites). Commercial VC equipment (largely Media Pro and Polycom) and digital lines (ISDN) were installed at project sites. Peripheral equipment included slit lamps, ophthalmology cameras, digital cameras and document cameras. Clinical consultations were mainly conducted at a bandwidth of 384 kbit/s and educational links were mainly at 128 kbit/s. An evaluation of the project showed that a total of 3,266 consultations, case reviews and patient education sessions took place between January 2002 and December 2003. Clinical use grew to 30% of all telehealth activity while educational use was approximately 40% (1416 sessions) and management use was about 30% (1031 sessions). The average overhead cost per telehealth session across all regions and usage types was $A192.[14]

Currently, telehealth services in WA are provided by the public health sector and there are no private providers of telehealth services. In 2008, seven public hospitals [(Royal Perth (RPH), King Edward Memorial, Sir Charles Gairdner, Prince Margaret, Fremantle, Graylands and Swan District hospitals] located in Perth provided a wide range of telehealth services to other metropolitan and rural hospitals and to nursing posts.17 The most common purposes for which VC is used are education (76%), wound care (55%) and psychiatry (53%) while the most common store-and-forward applications are tele-ECG and the use of still image transfer for dermatology or wound care. In 2005, the Princess Margaret Hospital (PMH) Burns Telehealth Service was established, providing an integrated multidisciplinary assessment and review service for rural and remote paediatric burn outpatients in WA. Through the use of eHealth technologies such as VC and store and forward digital photography, patients are reviewed and managed in their local community by rural and remote clinicians in collaboration with the PMH burns multidisciplinary team. Service activity has expanded rapidly, with the vast majority of rural paediatric burn outpatients now reviewed via the Telehealth service, instead of face to face appointments in Perth.

Case example:

▪ RPH Plastic Surgery Service manages 70% of the non-major trauma for the State plus new case referrals for skin, breast and head/neck cancer surgery, as well as managing difficult, chronic non healing wounds. More than 50 new referrals per week flow into the service. Another 20-30 unscheduled new case traumas arrive daily through the Emergency Department and Plastic Dressings Clinic. Of 3735 Plastic surgery patients treated at RPH in 2008/2009, 15% (555) were rural and remote patients. In 2010, the multidisciplinary Telehealth service involves a Consultant Plastic Surgeon, Clinical Nurse Consultant (CNC), Senior hands Occupational Therapist (OT) and supported by an administrative position. The majority of Telehealth services are provided for post-operative follow-ups from RPH. New case referrals are also accepted Doctor to Doctor. Service delivery is based on nurse and OT-led video conference clinics throughout the week, supported by one weekly medical video conference review clinic.

3.1.2   International telehealth implementations

ASIA

Telehealth is relatively new in Asia[15] and a recent literature review reported that research in telehealth is greatest in Japan, India and Hong Kong suggesting that the majority of telehealth activity is being undertaken in these Asian countries. The majority of telehealth applications rely upon ISDN for connectivity (used in 32% of studies) and most services are store-and-forward (43%), although VC was reported to be used in 35% of studies. The areas most frequently using telehealth include radiology for orthopaedic and neurology problems (17%); home telehealth (12%); ophthalmology (7%); pathology (6%); emergency medicine (5%) and cardiology (5%). Seven of the studies included in the review discussed the factors necessary for the successful implementation of telehealth initiatives and it was concluded that both sound technology and effective change management strategies were key.

CANADA

Telehealth activity commenced in Canada in the 1990"s and has undergone significant growth. Today, telehealth services are provided in all 14 Canadian jurisdictions.[16]

Case examples:

▪ The Western WNT Telehealth Network (WestNet Telehealth) was established in 1998 by the Territorial Department of Health and Social Services to provide telehealth services in three townships (Yellowknife, Fort Smith and Inuvik).   Initially, orthopaedic, internal

medicine and urgent and emergency X-ray consultations were provided. By 2004, a wide variety of clinical services had been established, including telemental health services, social services and tele-education. The latter being the most frequently used telehealth application. As at January 2004, there were 11 satellite-based telehealth sites (3 sites focus exclusively on telemental health services) in 9 communities;[16]

- The Ontario Telemedicine Network (OTN) was created in 2006 following the merger of three provincial telemedicine networks: CareConnect (Eastern Ontario), NORTH Network (Central & Northern Ontario) and VideoCare (South-western Ontario). OTN is a not-for profit organisation and is wholly financed by the Government of Ontario. It is governed by a Board of Directors and a board whose members include representatives from all regions within the province and from the continuing care and education sectors. In 2008, OTN had more than 336 partner facilities across Ontario including hospitals, community clinics and medical and nursing schools and provided VCs for medical consultations, emergency services, health education, store and forward technologies and tele-homecare. In 2008/09, more than 2700 health care professionals conducted 53,475 clinical consultations using telehealth;[17]

- The Nova Scotia Telehealth Network (NSTHN) - a computer-based telehealth network was established in Nova Scotia in 1999. NSTHN connected all 43 health care facilities across the province and the network was established to provide greater access to health care services for physicians and patients, primarily in rural areas, and to provide clinical and educational support to physicians and other health care workers. A survey of telehealth activity using VC across Canada in 2001 showed that VC was used to provide clinical consultations (primarily dermatology, psychiatry, and cardiovascular surgery), clinical case conferences, education sessions, and administrative meetings and in 2004, 350 telemental health consultations were undertaken;[16]

- A telehealth program was implemented in British Columbia (BC) in 2001 providing two types of clinical services – an ER-Trauma service in which a tertiary hospital facility provided clinical support for trauma and other emergency cases presenting at two peripheral sites, and a Maternal/Child/ Paediatric Palliative Care service in which a range of services were provided to 13 peripheral sites, including both hospital sites and community centres, by a tertiary hospital. Both services also provided ongoing continuing health education and supported administrative and management functions through VC. The program was independently evaluated and analysis of telehealth activity during the evaluation timeframe (between March 2002 and 2003) showed that 175 clinical services were provided, although usage has continued to increase steadily

since the data cut-off period (January 31, 2003), and average monthly utilisation rates for administrative, education and clinical sessions have increased by 34 to 69%.[18]

DENMARK

Funen Hospital in northern Denmark has been trialling telemedicine applications since the early 1990s. In 2007, more than 15 telemedicine applications were operational in specialities such as cardiology, endocrinology and radiology. A multidisciplinary electronic patient record is used together with telemedicine.[19]

NEW ZEALAND

A survey of telehealth activity in NZ in 2003/2004 reported that 22 telehealth projects were active with teleradiology and telepsychiatry services within acute hospitals being the most frequent clinical applications. Many projects were small and localised and longer term sustainability was found to be a problem with many projects failing to enter routine operations.

The majority of projects (9 of the 22) were on the North Island, concentrated around Auckland. The survey concluded that the provision of telehealth services in NZ was patchy, possibly in part due to the lack of a strategic framework.[20]

Case examples:

▪ Kiwicare Mental Health Services (KMHS) is a leading provider of health and hospital services in NZ and is responsible for the mental health needs of patients in two hospitals and in one rural community centre. In 1995, the general manager of KMHS presented a business case to management highlighting the financial gains of VC technology (savings of NZ$100,000 per annum) along with other advantages (e.g. reduced travel time for staff and patients). Subsequently, 3 VC systems were installed in the two hospitals and in the rural community centre with ISDN 128 Kbit/s bandwidth. Dedicated rooms were provided for telehealth and the equipment was used for meetings, training purposes and for providing telepsychiatry services to the rural centre. Although operating the equipment was not technically difficult, various difficulties were encountered. The clarity of the images and the sound were not acceptable to the psychiatrists, hindering frequent usage of the system. Bandwidth was upgraded to 384 Kbit/s and although the clarity of the images was enhanced, the sound quality remained poor and there interruptions due to the technical difficulties were frequent. Further problems included the lack of dedicated technical support staff and the expectation for psychiatrists to physically move to the dedicated rooms to provide the consultations. Recognising the need for support

staff and processes, KMHS secured funding for a staff member to coordinate VC sessions and schedules, however, after 12 months, funding for the position was discontinued and telehealth activity also discontinued.[21, 22]

NORWAY

Telemedicine is well established in Northern Norway. Since the late 1980"s, the University Hospital of North-Norway (UNN) has been active in a wide range of applications including: teleradiology; telepathology; teledermatology; tele-otorhinolaryngology (remote endoscopy); remote gastroscopy; teleechocardiography; remote transmission of ECGs; telepsychiatry; teleophthalmology; teledialysis; tele-emergency medicine; tele-oncology; telecare; telegeriatrics; teledentistry; maritime telemedicine; electronic referrals and discharge letters; electronic delivery of laboratory results and distance education. In 1996, Norway became the first country to implement an official telemedicine fee schedule allowing reimbursement for telemedicine services by the national health insurer.[23]

Case examples:

- Teleconsultation within dermatology started in 1988 between the University Hospital of North Norway (UNN) and Kirkenes Hospital and in 1996, UNN established teleconsultations with Hammerfest Hospital. Both remote hospitals conduct teleconsultations weekly, normally with 10-12 patients. These consultations last for 2½ to 3 hours altogether. Both Kirkenes and Hammerfest hospitals have equipment for treating dermatological diseases and are able to offer their patients treatment locally.
Two teledermatology services are offered: (i) Videoconference consultations: Patient and general practitioners (GPs) (or other health workers) meet with the specialist through VC. Most patients get immediate response and treatment is started (if needed). This service is in regular use between UNN and Finnmark. (ii) exchange of still images: clinical photographs and referral (from GP to specialist) are sent by email;
- In 2003, 84 of 200 GP offices in North-Norway had VC equipment and GPs using this service are generally satisfied, and have gained new knowledge that has enabled them to better screen patients for referral to hospital. Another lesson, which applies to most of the telemedicine services that have been established, is that cost saving depends on volume. The cost-effectiveness of telemedical services and electronic messages is dependent on investment costs, the number of consultations or electronic messages per year, as well as the costs of travelling to a specialist hospital;
- Sixteen GPs who were using telehealth services in Northern Norway in 2002 were interviewed to identify barriers and facilitators in using these services.[24] The most widely

used service was teledermatology while other available services [cardiology (heart sound monitoring of infants), ear, nose and throat (ENT) medicine, and plastic surgery] were hardly used. For the GPs, the advantages of telehealth services were shorter response times, the opportunity to learn and the possibility of teamwork.

UNITED KINGDOM (UK)

Telemedicine projects commenced in the UK in 1991[25] and currently telehealth services include teleradiology, teleneurosurgery, telepsychiatry, transmission of echocardiographic images, electronic referrals and videoconferencing between primary and secondary providers. The majority of services are provided by small scale, pilot projects.

Case example:

- The Scottish Centre for Telehealth (SCT) was established in 2006 by the Scottish government as a centre of expertise to help develop and support best practices in telehealth. The SCT has been involved in a large number of projects including the Scottish Telestroke Network; ENT tele-endoscopy in the North of Scotland; the Aberdeen A&E pilot video booth which enables patients to receive a remote teleconsultation and use various medical devices, which upload directly into an electronic medical record; support for people with long term neurological conditions (epilepsy, motor neurone disease (MND) and chronic pain) in their own homes using VC; the development of the Paediatric Telemedicine Network, which includes the linking of facilities without specialist paediatric units with Scotland‚s 4 children‚s hospitals; the Tele-TIA clinic linking Orkney to the stroke unit at Aberdeen Royal Infirmary, which helps NHS Orkney meet the national target of enabling patients experiencing symptoms to be seen by a specialist, within 24 hours of presentation, via a video link and the set-up and evaluation of a pre-hospital thrombolysis service in collaboration with NHS Highland and the Scottish Ambulance Service. To date, the majority of the SCT‟s work, and telehealth generally in Scotland, has been project based with some exceptions (i.e. paediatrics, stroke, and out of hours/minor injuries services), where telehealth services are increasingly becoming part of mainstream service delivery. A major challenge to telehealth is making the transition from discrete projects into mainstream service delivery key issues encountered have been poor communication and confusion over the role, purpose and direction of telehealth programs. A review of the SCT[26] in 2008-2009 recommended that, to overcome this challenge, the SCT should become more strategic and initially focus on one or two clinical areas moving them from projects to universal use e.g. building on the existing paediatrics and stroke networks. To further facilitate the

transition of projects from „pilots‟ to national implementations and to promote the integration of telehealth and telecare initiatives, the SCT was incorporated into NHS24 in 2010.

UNITED STATES OF AMERICA

Telehealth services are well established in the USA and in the last 10 years, there has been considerable investment in the development of telehealth networks and demonstration projects. These include two statewide telemedicine systems: Maine Telemedicine Services (MTS), and the Arizona Telemedicine Program. Improvements in the reliability and capacity of interactive telemedicine technology, in combination with declining costs for equipment and telecommunication lines have contributed to this growth in telemedicine programs and networks.[27]

Case examples:

- Maine Telemedicine Services (MTS) consists of a network of over 200 health, mental health and social service organisations and is one of the largest statewide telemedicine networks in the US. MTS commenced operations in 1998 and is largely self-sustaining. Approximately 2,000 sessions are provided annually and a broad range of interactive VC applications are offered with the major applications being mental health/psychiatry, endocrinology/diabetes management, primary care, specialty pediatrics, genetics, and dermatology.[28] A combination of video conferencing equipment is used, including Polycom and Picturetel. Connectivity is provided over ISDN at speeds ranging from 128 Kbit/s to 384 Kbit/s. Peripheral devices are used and these include document cameras, high-quality examination camera, digital stethoscopes and otoscopes. Multi-point bridging is used where needed. To develop the network, MTS staff initially conducted telemedicine demonstrations and presentations and held discussions with potential partner organisations which assisted MTS and partners to identify clinical needs that could be met by telemedicine. MTS also provides services including telemedicine demonstrations for providers, training of local site coordinators, protocol development, scheduling, quality assurance, and continuing medical education planning and the network continues to be promoted through professional and public presentations, press releases, newsletters, and Continuing Medical Education (CME) and other events;

- The Arizona Telemedicine Program (ATP) is a multidisciplinary, university-based program that provides telemedicine services, education, informatics training and telemedicine technology assessment capabilities throughout Arizona. It was established in 1996 with funding from the Arizona legislature, which mandated that it provide

telemedicine services to a broad range of health care users including geographically isolated communities, Indian tribes and rural prisons. The ATP has successfully created partnerships among a wide array of both not-for-profit and profit healthcare organisations, and in 2008, the program provided telehealth services to 20 communities and continuing education to 34 communities using videoconferencing. Services are available in 60 subspecialties of medicine, surgery, paediatrics, psychiatry, radiology, pathology, and others;[29]

- The Veterans Health Administration (VHA) is the largest integrated health system in the US and in the 2007-2008 financial year, VHA clinicians provided telehealth services to over 230,000 patients, mental health services were provided via real-time clinical videoconferencing at 300 VA community-based outpatient clinics, and 130,000 patients received telehealth services using store-and-forward technologies.[29, 30] In addition, over 40,000 veterans are enrolled in the VA„s home telehealth program and are monitored remotely in their homes through technology that allows physicians to track patients‟ health indicators, such as blood glucose levels and blood pressure. This patient monitoring has allowed VHA to significantly reduce hospital admissions.[31] Several factors underpin VHA‟s successful implementation of telehealth services including the universal use of standardised electronic medical records (EMRs). Another factor is that VHA practitioners who provide care as part of a federal system are not subject to the same cross-state licensure restrictions that exist in many other public and private telehealth care settings. In addition, the large-scale utilisation of telehealth in VA settings is also facilitated by a payment system that is not subject to the range of restrictions imposed by many other third-party payer arrangements.

SWEDEN

Sweden has been conducting various forms of telemedicine for over 80 years, commencing with the use of radio and telephone to perform telehealth consultations. Currently, a wide range of health technology-related applications are in use including electronic regional networks; online multi-site VCs; pre-hospital care via links between ambulances and hospitals; on-line consultations during neurosurgery; telepsychiatry and outpatient care; telemonitoring for diabetes care and integrated care and teleradiology which is a standard procedure. A number of the challenges that Sweden continues to face in the telemedicine field are organisational including the integration of EHRs into the system; resistance to change; perceived threats to the (health) organisation and (health) workplace; issues of finance and reimbursement; issues relating to time, responsibility, sustainability and the lack of promotion of the benefits of telemedicine by clinicians to others (e.g. health managers). Additional issues

include security and privacy particularly in relation to data handling by third countries and the lack of apparent clarity or knowledge about what is or is not permissible   in any given situation.[19]

3.2   Stakeholder analysis

The following section describes the results of a comprehensive consultation effort aided by the synthesis of reports, telephone interviews with nominated personnel, web-based searches, and a systematic online survey administered to GPs in Australia.

3.2.1   Health departments in Australia

As described in the previous section, we investigated a range of factors associated with the establishment, management and coordination of telehealth services. While there were certainly some common underlying trends in terms of governance, network design and nature of activity, we were able to ascertain subtle differences between the individual states and territories in Australia.

The history of telehealth activities in Australia goes back to the late 1990s when an Australian Government funding allocation enabled Departments of Health in states and territories to initiate telehealth projects. However, several significant telehealth projects have also emerged as a result of recent allocation of funding by the Australian government. The "Clever Networks" projects, funded by the Department of Broadband, Communications and the Digital Economy (DBCDE), of which two Victorian regions (the Grampians and Loddon Mallee regions) are examples. The Northern Territory Telehealth Program funded under the Digital Regions Initiative in 2010 is a further example of a recently established telehealth program.

In general, telehealth in Australian States and Territories includes a wide variety of activities such as clinical, educational, administrative and research. While videoconferencing is widely used for telehealth practices, other tools such as email and web applications are also used. Telehealth practices predominantly take place in hospitals, mainly to provide clinical services or education from tertiary hospitals to rural and remote locations. Telehealth covers a wide range of clinical disciplines. Some of the most established telehealth disciplines are mental health, neurology, plastic surgery, burns, physiotherapy, post-liver transplant care, diabetes support, aged care assessment, speech therapy, and palliative care.

The level of telehealth practice by General Practitioners is low. This is a common feature across Australia (and internationally). There have been some attempts to involve GPs in telehealth activities. For example, at a research level, Queensland Health is undertaking a project to determine the feasibility, acceptability and cost effectiveness of general practice based screening for diabetic retinopathy and monitoring. Another example is in Victoria, in the Grampians region, where some GPs use videoconferencing to share after hours roster. Tasmanian Health Department is also planning to expand GP based telehealth to provide services to isolated locations such as Bruny Island.

While there have been no systematic reviews of telehealth in Australian States and Territories, the available data indicates limited activity.

The data from some established telehealth services are as follows:

- Telepaediatric service in Queensland – 2,500 consultations per year;
- Mental health service in South Australia – 1,800/2,000 consultations per year;
- Plastic surgery service in Western Australia – 1,200 consultations per year;
- Tele-neurology consultations in Western Australia – 600 consultations per year.

It is evident that in most States and Territories, there is a large and well equipped videoconferencing network to facilitate telehealth practices. In terms of equipment, dominant brands currently used are Polycom and Tandberg. However, in some states, a mixture of different bands is in use. For example, in South Australia, each area health department has independently developed its own telehealth environment and this has led a variety of brands and equipment use. South Australia did not report any interoperability issues within the various state health systems.

Telehealth services in Australian States and Territories are predominantly operated using private networks of the respective state health department. In Victoria, for example, the Grampians telehealth project uses the network of Grampians Rural Health Alliance which is a private fibre based network between all health services, community health services and bush nursing hospitals in the Grampians region of Western Victoria. In some cases, public networks are also used, e.g. Telstra ISDN.

In most cases, there is no centralised coordination or management of telehealth activities. However, there are several examples of established centralised systems for some aspects of

telehealth. For example, in New South Wales, a statewide contract is in place for maintenance and helpdesk support with a private vendor for machines purchased by the Department of Health. In Queensland Health, Statewide Telehealth provides centralised technical support to all telehealth sites. However, across Australia, in general the coordination of telehealth consultations, technical support, and management is de-centralised.

From the privacy and security perspectives, most health facilities have dedicated rooms for telehealth consultations. Doctors take responsibility for privacy and security aspects when telehealth consultations take place using mobile units in wards or other open areas. However, there are no electronic security systems currently in use to ensure privacy and security of patients involved in telehealth consultations. Most telehealth services rely on the security embedded in the networks such as ISDN. No encryption and authentication systems are in routine use in telehealth services in Australia.

Except for Queensland Health, no other telehealth service has an explicit consent policy. In general, the patient consent for treatment is considered adequate for telehealth practice. However, Queensland Health consent policy stipulates that written consent must be obtained from the patient or from a guardian for a consultation to take place by telehealth.

Although change management is considered to be a key enabler for successful telehealth, no explicit change management processes currently exist.

Operators of telehealth services across Australia state that they are aware of patient confidentiality issues that relate to the recording of videoconferencing consultations. Although the technical capabilities are in place, state telehealth services indicate that they do not routinely record telehealth sessions. Only on occasions, some clinical sessions are recorded for educational purposes, but in those cases, patient consent is sought and the images are reportedly de-identified. No other drivers for recording telehealth sessions have been identified.

The usefulness of access to electronic health information was considered important by all interviewees. However, it was indicated that currently there is no such capability. Sharing of health and medical information for telehealth practices occurs in a fragmented manner. In some cases, medical imaging information (either via networked picture archiving and communications systems [PACS] or other methods of sharing images, e.g. by email) is

available for clinicians. The need for a seamless access to health information is an issue of interest and importance to all states and territories.

Though the need is acknowledged, most states do not currently perform any systematic evaluation or reporting of telehealth activities.

3.2.2   General practitioners

An online search of „grey" literature pertaining to general practitioners and eHealth, specifically video consultation, was undertaken to identify current practice and attitudes. An initial search in Australia resulted in 5170 „hits", the majority of which were articles from the last six months related to the NBN and political discussions. Theoretical and anecdotal examples are numerous but details describing the practicalities of videoconferencing for GPs are lacking.

- "One after-hours general practitioner supporting two townships quite a distance apart. With video conferencing, after-hours emergency care can be delivered quicker making it easier on the doctors who are on call because now they don„t have to drive to the next township to provide care";[32]
- There were very few examples of any practice of video consultations involving general practitioners. One study in a mining town in Western Australia reports that 75% of consultations held presumably in the GP„s office with patients and specialists in Perth, resulted in the patient not requiring transfer for follow up care;[33]
- In Western Australia, the model of care for thoracic cancer patients includes care by video consultations, stating it is "Expected that patients in rural and remote communities will have access to (specialist) care and that this will be coordinated by their GP, local specialist or cancer nurse coordinator using video-conferencing or assisted travel where appropriate";[32]
- It is not clear how frequently GPs are involved in videoconferences with specialists. Case conferences which include the GP via video are also advocated for the management of people living with dementia in rural and remote areas.[34]

There is consensus that telemedicine has the ability to offer a partial solution to the inequities in access to health services, particularly for rural and remote populations.[35] A literature review in 2009 identified 143 articles relating to rural Australian and telemedicine and reports that patients have benefited from lower travel costs and reduced inconvenience while accessing specialist health services; improved access to services; and improved quality of clinical services. Health professionals are reported to have benefited from: access to continuing

education and professional development; provision of enhanced local services; and experiential learning, networking and collaboration.[36] The review goes on to state that:

"the increased use of telehealth, has the potential to reduce the inequitable access to health services and the poorer health status that many rural Australians experience, and contribute to addressing the on-going problem of the recruitment and retention of the rural health workforce. And that "The use of telehealth appears to be a path to up-skilling for rural and remote practitioners".[36]

The focus appears to be on the educational value of telehealth for practitioners, rather than the potential for patients to be seen via videoconference.

Telepsychiatry is the only application that is consistently reported as currently having activity involving patients directly on video consultations.[37-39] Many rural health centres have established facilities for this purpose and mental health is reported to be particularly suited to being carried out at a distance.[40] Generally however these consultations involve patients attending a health centre and participating in a consultation with a health specialist via videoconference. The Australian and New Zealand College of Psychiatrists recommend that a GP be included in at least the first video consultation with a new patient, however there are no statistics reported to confirm that this occurs.

There is very little evidence concerning the take-up of telemedicine in the home. The concept of telemedicine support involving patients in the home may cover a range of communication techniques depending on the nature of the information being exchanged. According to Webb,[41] home telemedicine has four components:

- Use of telephone only (patient to physician direct audio conversation);
- Use of website and/or email (web-based or email questionnaire);
- Use of home monitoring devices only (illness specific or general medical diagnostic devices which send information to physician for assessment); and
- Home consult video conference via personal computer (patient to physician direct videoconference via internet with or without use of medical diagnostic devices).[41]

However, despite there being published evidence supporting the economics and patient satisfaction of home telemedicine, take-up has been slow in Australia.[36, 42]

A report in 2008 by Ellis suggests that telemedicine is of interest to GPs, but that they overwhelmingly value face-to-face consultations, finding video consultations cumbersome, complex and time consuming.[43] The need for a third party to manage the technical aspects of a video consultation, particularly for the patient end, requires evaluation. Evaluation of patient satisfaction of video consultation is was considered important.[40]

There are multiple examples of education for general practitioners routinely being available via video conferencing.[44-47] Grand rounds, registrar training sessions and continuing education sessions are some of the reported activities.

A report from Health Workforce Queensland, a rural GP locum program, found that 45.8% of GP„s surveyed had access to videoconferencing equipment (mostly through local hospitals). The report doesn„t however indicate how many GP„s actually utilise video conferencing equipment for patient care.[46] Another report in 2005 described the reduction of GP"s utilisation of video conferencing facilities from 1998 to 2001, indicating that facilities have been available to GP„s for over 10 years. The disincentives of the physical location of the equipment and technical problems were thought to be the cause of the reduction of patient consultations.[8]

An electronic survey was developed to ascertain Australian General Practitioners understanding of telehealth and its potential application to their practice. The survey was issued in November 2010 (for a period of two weeks) to the 111 Australian Division of General Practice groups, who were asked to forward the survey on to GP„s within their respective networks. 126 participants responded to the survey during a two week period. The majority of respondents were from Queensland (60.9%), see Figure 1.
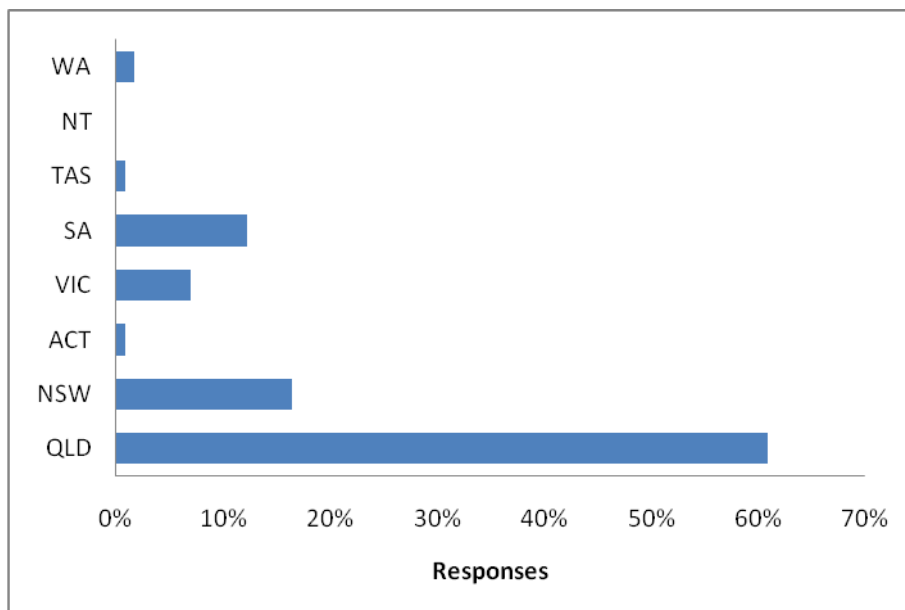
Figure 1. Which State/Territory is your practice located? n=115

There was a fairly even distribution of GPs according to nature of work with about 33% from rural locations and 41% from regional locations (see Figure 2).
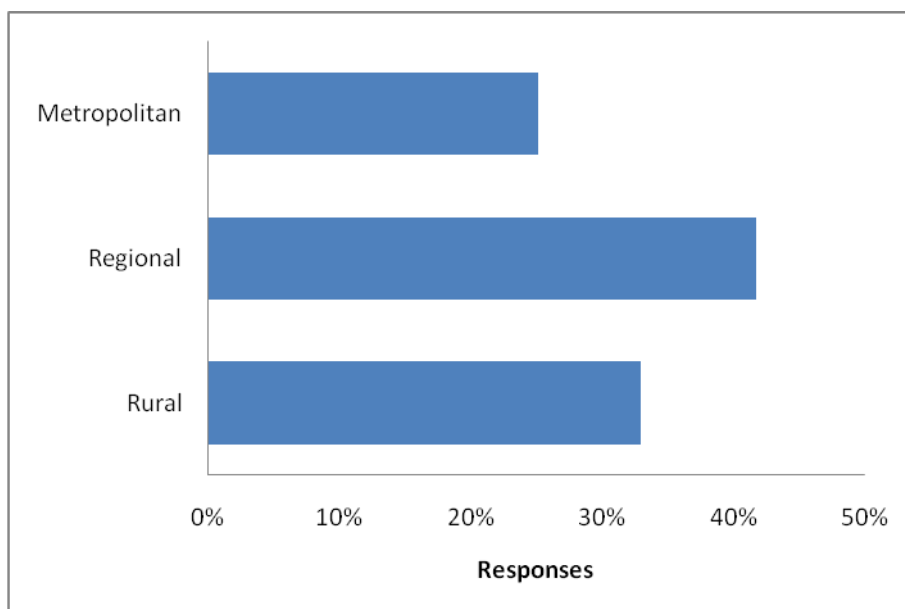
Figure 2. What best describes the nature of your practice? n=115

Most practices were multidisciplinary employing nurses in 90.4% of cases and allied health professionals in 78.9% of cases. The GPs participating in the survey varied in the number of referrals generated to specialists each week. About 15% referred less than 10 patients to a

specialist each week, while about 13% (primarily metropolitan practices with multiple GPs) referred more than 100 (Figure 3).
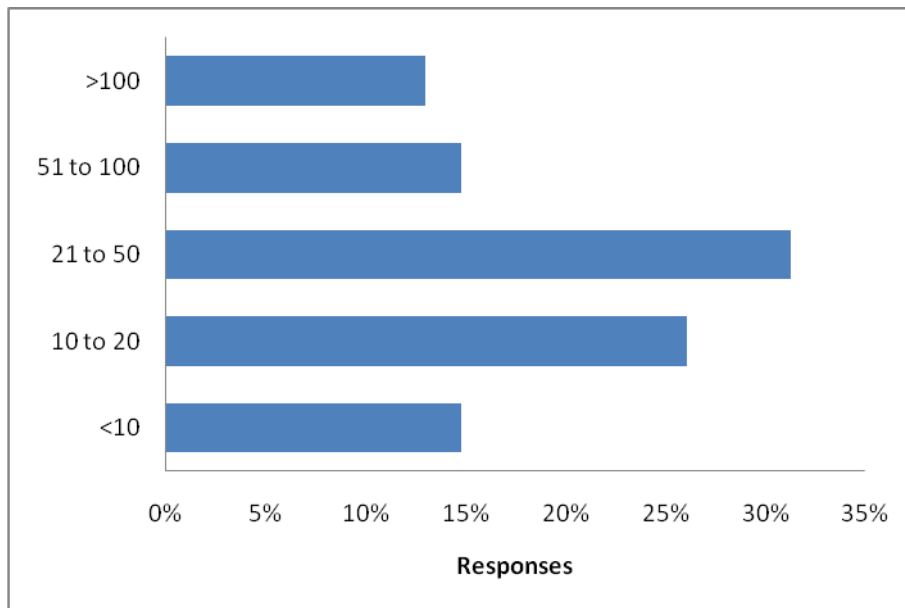
Figure 3. Approximately how many patients does your practice refer to a specialist per week? n=115

In terms of accessing specialist advice, the telephone is used regularly by about 92% of GPs (Figure 4) while email is used by about 30% of GPs surveyed (Figure 5).
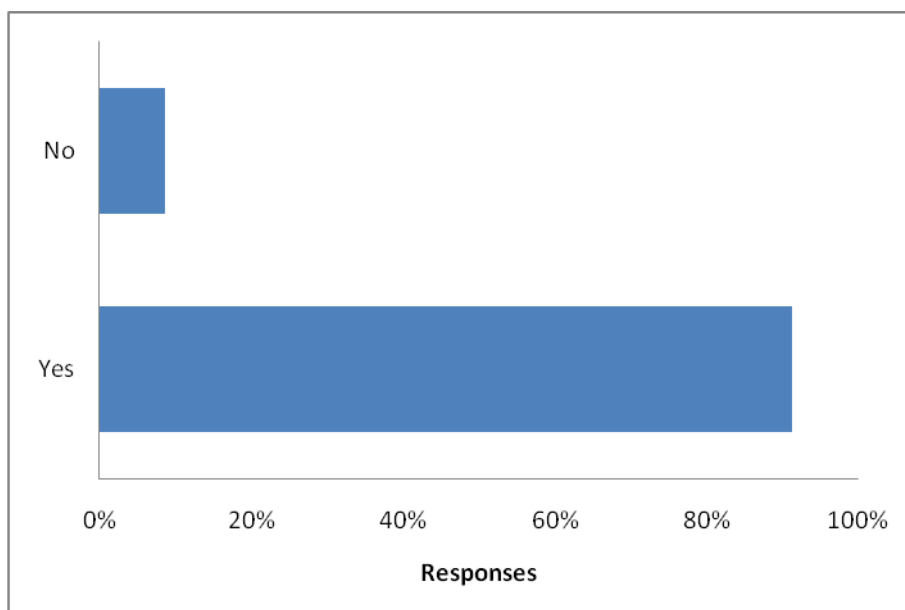
Figure 4. Do you currently seek advice using the telephone? n=115
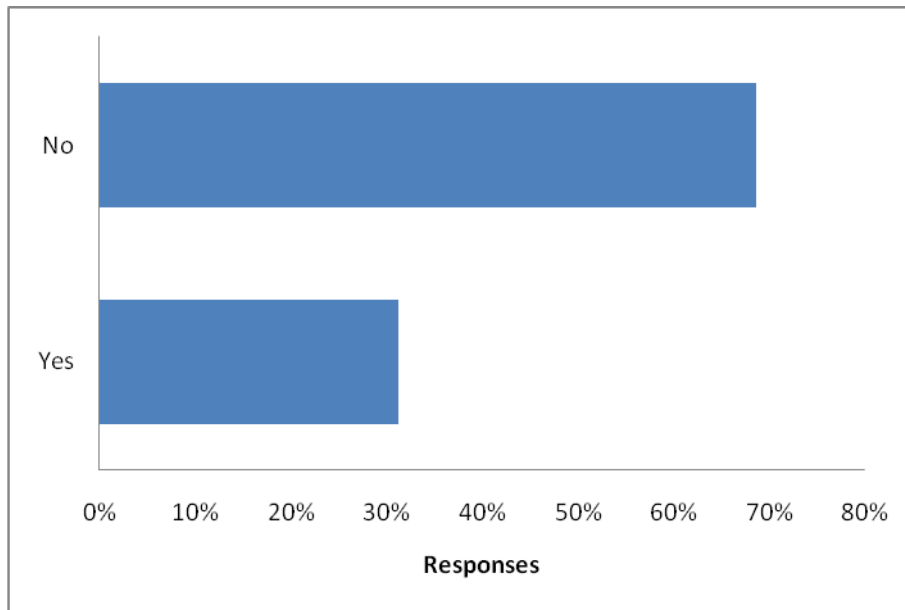
Figure 5. Do you currently seek specialist advice using email? n=115

There was a wide variety in the participant‚s general understanding of the term "telehealth". 43% of GPs described themselves as having minimal understanding and 13% claimed to have no understanding of the term (Figure 6).
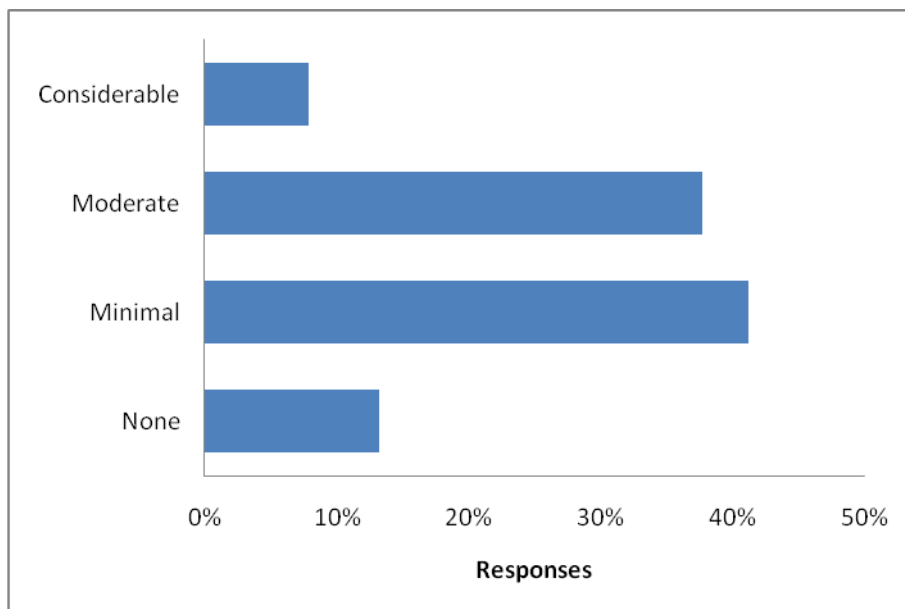
Figure 6. How would describe your understanding of telehealth? n=127

In terms of telehealth usage, 17% of GPs reported that they currently use telehealth in their practice. Telepsychiatry was the most common use reported comprising telehealth consultations (VC and telephone) between specialists and local health teams, mainly provided through public hospitals. Other example applications included radiology and education. When participants were asked if they were aware of any GP based telehealth initiatives, 89% responded "no". Teledermatology, mental health and „online doc" programs were the applications reported by the 11% of participants who were aware of GP based telehealth initiatives.

Participants were asked to comment on anticipated take-up of telehealth to consult with specialists or patients with the introduction of reimbursement for telehealth consultations. In terms of using telehealth to access specialist services, 51% thought take-up would be limited, while about 9% thought it would be considerable, (Figure 7). For contact with patients at home, about 60% felt that take-up would be limited, while 12% anticipate considerable take-up, (Figure 8).
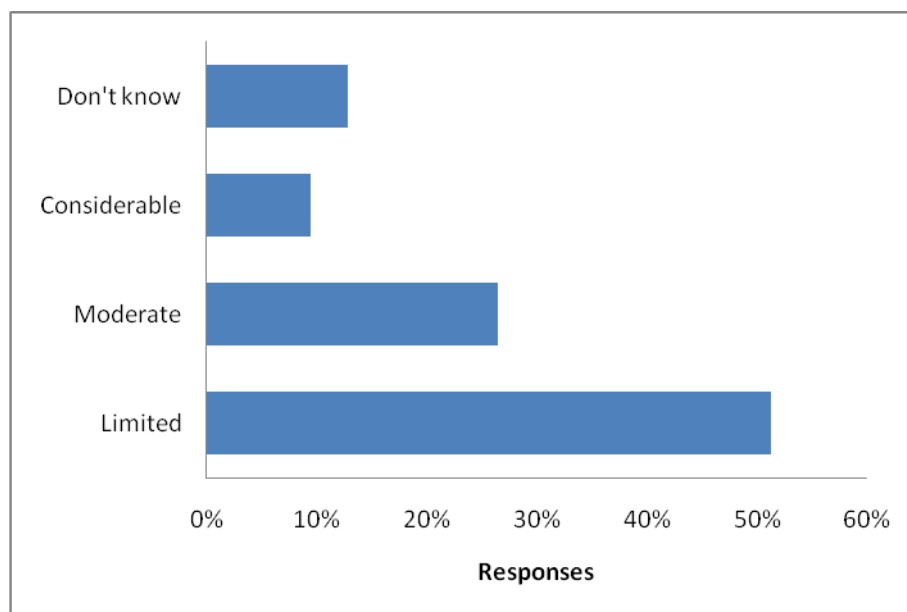
Figure 7. What do you predict the take-up to be like for access to specialist services by telehealth? n=117
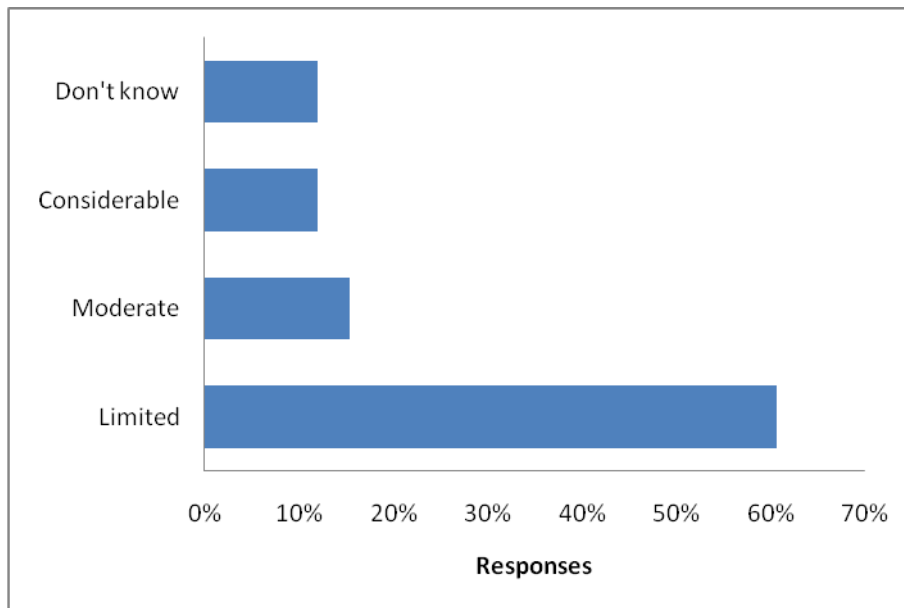
Figure 8. What do you predict the take-up to be like for access to patients at home by telehealth? n=118

The participants who didn‚t anticipate using telehealth gave a range of reasons that fell into five main themes: (i) Concerns regarding the inability to examine patients and possible resulting liability or misdiagnosis; (ii) lack of time; (iii) lack of resources; (iv) a belief that telehealth was of no benefit and (v) because they didn‚t know how they would use or access telehealth facilities.

The lack of perceived control over a telehealth consultation was evident with comments such as:

- ”Unsafe, uncomfortable and too open to time wasting, Consultation out of my Control”;
- ”Too many uncontrollable issues- (I) would rather see (the) patient”;
- ”Not sure how to take vital signs or actually do hands on medicine via a computer screen, this is removing a significant aspect of holistic care”.

When asked what proportion of their work could potentially be done by telehealth, about 50% of GPs felt that none or less than 5% could be done using telehealth. 11% of participants were unsure what proportion of their work could be supported by telehealth (Figure 9).
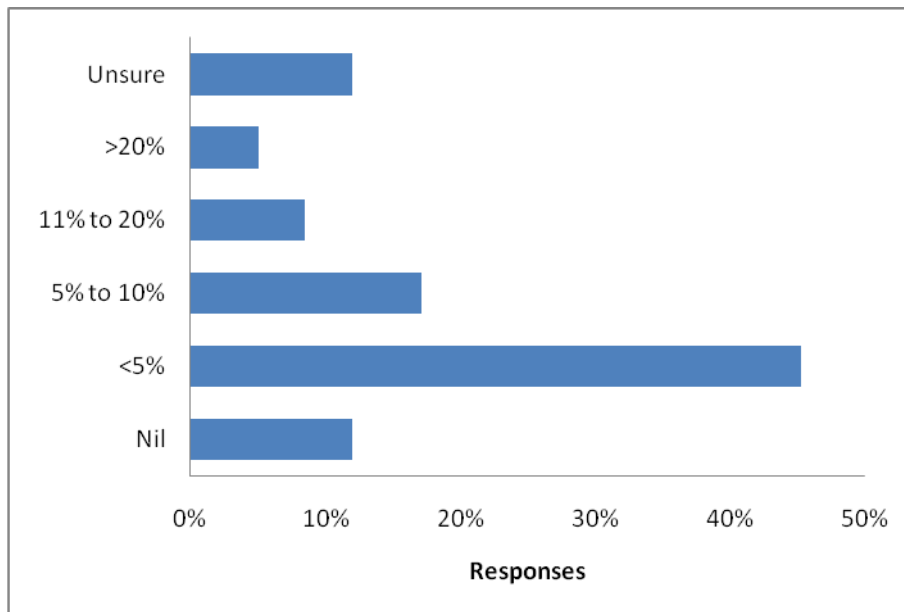
Figure 9. What proportion of your work could be done by telehealth? n=117

Participants were asked what they perceived the likely benefits of telehealth within their practice to be. Answers were divided into those who believed there would be benefit (64%) and those who didn‚t (25%) or were unsure (11%). The answers of the 64% of participants who believed there would be a benefit categorised into general themes: 30% described the ability to access specialists either for patients, or directly for advice as the primary benefit of telehealth. 24% believed there would be a small benefit for a small population of patients, for example rural or housebound patients who couldn‚t attend an appointment in person. 11% thought telehealth would save travel and time expenses for patients, 10% a saving of time for GPs, 9% that it would increase efficiency, 8% an improvement in communication and 6% that it would be convenient. The benefits of an electronic health record were only mentioned by one participant.

Some participants were wary of telehealth and how it could be of benefit to their practice; "I can't imagine how telehealth would assist me in practical terms" and "I would hope that it would make more efficient use of my time but I also fear that some individuals would take advantage of me." Others could see the advantages; "patients not having to drive hours to the nearest specialist", "I would find it beneficial to access specialist advice in certain clinical areas where currently our area is poorly serviced" and "Convenience, if appropriately set up. Potentially time saving, but new skills will be required to avoid errors" are examples of some of the comments made.

When asked about the disadvantages telehealth would pose to their practice, 10% answered none. The majority of the remaining participants responded with similar concerns to previous questions with the need to examine a patient and potential legal ramifications due to misdiagnosis being a high concern (46%). Other concerns reported by participants included disruption to services (29%), technical aspects/ IT support (19%) and the cost of infrastructure (13%). A smaller number of participants were concerned about loss of rapport and/or unrealistic expectations from patients and confidentiality issues. Examples of comments from this question illustrates that while some believe telehealth can save time, it is also perceived to take more time to set up, document and run a telehealth service.

- "It will be difficult trying to coordinate appointment times with patient, GP, and specialist (particularly if one or more of these are running late)";
- "Utilisation of additional GP and/or nurse time when this is already in short supply";
- "It is another thing to keep track of. If I was doing this with patients at home I would need to find a time to allocate to this task";

Participants were asked if any other incentives should be given to encourage the use of telehealth in general practice. Equipment and the associated infrastructure with staffing to support telehealth activates was recommended by 36%. 28% of participants felt no other incentives were required and a smaller number made suggestions such as the need for clear guidelines on the appropriate use of telehealth, education, processes for documentation and generous reimbursement for activity. When asked about the logistical/practical needs for telehealth to be successful in their practice, similar answers were obtained with staffing, equipment and IT support rating highly. Space was another reported issue, as was the need for more time, education and an increased take-up of telehealth by specialists.

Most GPs who responded to the survey were not currently using telehealth and described limited potential use in their practice. Using telehealth to access specialists was identified as the greatest benefit for both patients and for GP‚s seeking advice, however this benefit remains dependant on acceptance and take-up of specialist use of telehealth. The participants highlighted a number of concerns regarding home telemedicine including the inability to examine the patient and associated potential ramifications as well as the time, money and effort needed to establish a telehealth service for home care. While it is acknowledged the survey was completed by a limited number of participants, it provided useful information and clarification of some of the concerns that GP‚s hold regarding telehealth.

3.2.3   Specialists

The following issues were collected through discussions with specialists and representatives from peak professional bodies such as the Australian Medical Association (AMA); National eHealth Transition Authority (NEHTA), The Australian College of Rural and Remote Medicine (ACRRM) and the Committee of Presidents of Medical Colleges (CPMC).

Table 2: Issues arising from stakeholder consultation (specialists)

Coordination	Crucial to have a well organised coordinator who is GP and specialist focused. If this is not possible, then any system no matter how good it is will fail. This will include bookings, charging, follow-up on referrals, etc.
Time allotment	It is very difficult to organise acute referrals as would have to cancel own clinics to attend to. A dedicated time e.g., like a clinic time would be the best. Ideally it may be better to have an email with X rays and pathology included to review before clinic. The specialist will have to be „off line" at either the rooms or at the Hospital. The place for email and photographs need to be assessed.
Patient perspective	Most of the patients will feel uncomfortable with seeing themselves on the screen so would need to have a process of making them feel more relaxed and able to talk. The patient‚s needs also need to be addressed so they feel that they have also gained something out of the consultation.
Equipment	Basic equipment is all that is needed and perhaps a video- camera. It is not an expensive outlay. Control of the "picture" could be done by the specialist if necessary.
Facilities	A room with minimal noise and interruptions is necessary at both sites. Adequate light, comfort and a clear picture are needed. If the GP is not there then a nurse needs to be present.
Education	This is very important to ensuring that the Telehealth GP-specialist link continues. It may be preferable to have a structured course for this and covering aspects of communication, ethics, equipment, patient management by video conferencing, etiquette etc. A basic structural approach is suggested to assessment and feedback.

Other aspects	**Fee structure -** Clarity is needed in this area and assurance that Government funding will reimburse both the provider and receiver of telehealth services. **Confidentiality/Privacy –** Advice regarding privacy and confidentiality is considered important, particularly in the context of consultation with patients using online techniques. **Integration with existing programs -** The more streamlined the better. Ideally online communication, billing, service provider registers, clinical reports should all be integrated for convenient access to information. **Management of acute and non acute patient referrals -** The review of acute patients may be difficult as it would disrupt the specialist‚s clinic patients and would not be appreciated. **Reports -** Systems should be available to facilitate the communication of clinical decisions to the referring practitioner.

AUSTRALIAN COLLEGE OF RURAL AND REMOTE MEDICINE (ACRRM)

The Australian College of Rural and Remote Medicine use telehealth to support doctors in rural and remote areas of the country. Telehealth in the field of dermatology and radiology are relatively mature services delivered through ACRRM, each designed to facilitate training opportunities for GPs and assist with clinical decision-making. The ACRRM services are funded by the Australian Government through the Medical Specialist Outreach Assistance Program (MSOAP), and are accessible to GP‟s through store-and-forward techniques such as email and secure websites. The referral process used by ACRRM allows GPs in Australia to send de-identified clinical information (images, case history, reports) via email. The reported response time from point of referral is less than 24 hours. Retrospectively, the take-up of this service has been limited with approximately 500 cases reviewed during the last five years. Reported barriers associated with the delivery of ACRRM telehealth services were reported to be cross-border registration, legal/ethical and remuneration issues.

3.3 Implementation of telehealth (videoconferencing) services

On the basis of these case studies and review of the literature[8],[18, 49-52], key requirements and conditions for the successful implementation of VC for telehealth have been identified. They can be grouped into three broad categories: (i) Technological requirements; (ii) Organisational issues and (iii) Funding issues. These are discussed below:

3.3.1 Basic technological requirements

- The VC technology must meet the operational demands of each healthcare site i.e. the technology must meet certain minimum requirements to ensure adequate clarity of picture and sound;
- There must be adequate infrastructure to support VC. The broadband connection must be of sufficient bandwidth to enable all connection points to send and receive large, complex data sets quickly and accurately;
- The technology at the central and remote sites must be compatible;
- Ongoing technical support must be provided by dedicated support staff. This is particularly important in the start-up phase of any project;
- The equipment must be convenient and easy to use. This means the equipment must be conveniently located (e.g. having to move to another location to use the equipment is a deterrent to using it) and user-friendly.

3.3.2 Organisational issues

Telehealth services should be „*needs driven*" and planned in collaboration with local clinicians. A needs assessment and analysis should be conducted at the outset and involves defining a community„s healthcare needs and how these can be addressed by telehealth. The adoption of a „*bottom-up*„ approach in which local stakeholders, including healthcare providers in particular, are consulted to identify areas of clinical need that may be addressed by telehealth and plan the service is critically important to creating a sense of *ownership* in the project at a local level and contributes greatly to a project„s success. Clinicians will require clear concise information that the service will provide *clear benefits* or advantages if they are to use it.

In addition to the bottom-up approach, a *top-down management approach* is also required to successfully implement telehealth services. *Strong executive leadership,* including vision and long-term strategic planning together with support by senior-level administration is critical to the success and sustainability of telehealth services.

3.3.3   Funding issues

Regardless of the nature of the telehealth service, it is important to gain a clear understanding of the costs of telehealth. This is often challenging due to the variety of methods available to conduct telehealth, and to the variable costs associated with the delivery of health services (which incorporates staff salaries, telecommunications and administrative support/coordination).

▪ Develop a financial plan for the telehealth service. This should include details of how a service will be funded and costs potentially shared across sites, both in the start-up phase (i.e. initial capital costs) as well as ongoing operational costs. This financial plan may be developed at the practice or regional level depending on the implementation;

▪ To encourage sustainability, adequate long-term funding is required and in order to be as cost effective as face-to-face consultations, a sufficient volume of consultations must occur, beyond which point, cost savings may be realised. Most telehealth projects involving VC take at least 2-3 years before usage becomes optimal.[52]   The focus on telehealth should not disregard the costs of an appropriate infrastructure, but should incorporate all of the additional recurrent costs (including coordination, planning and support).[8]

3.3.4   Medicare reimbursement

The Medicare Program („Medicare„) provides access to medical and hospital services for all Australian residents and certain categories of visitors to Australia. Medicare Australia administers Medicare and the payment of Medicare benefits. The major elements of Medicare are contained in the *Health Insurance Act 1973*, as amended, and include the following[53]:

a)   Free treatment for public patients in public hospitals.

b)   For private services, the payment of „benefits„ or rebates, for professional services listed in the Medicare Benefits Schedule (MBS). In general, the Medicare benefit is 85% of the Schedule fee, otherwise the benefits are:

   I.   100% of the Schedule fee for services provided by a general practitioner to non-referred, non-admitted patients;

   II.   100% of the Schedule fee for services provided on behalf of a general practitioner by a practice nurse or registered Aboriginal Health Worker;

   III.   75% of the Schedule fee for professional services rendered to a patient as part of an episode of hospital treatment (other than public patients);

IV. 75% of the Schedule fee for professional services rendered as part of a privately insured episode of hospital substitute treatment.

Telepsychiatry and some case conference items are examples of consultations performed via videolink that attract reimbursement through the MBS. Since the introduction of the telepsychiatry items in 2002 take-up (based on Medicare expenditure) has been unremarkable. Telepsychiatry consultations accounted for approximately $617,000 up to June 2010.[54] The low take-up hints that funding alone will not cause a dramatic surge in telehealth activity. Other key factors must be considered and these are explained in greater detail in the forthcoming sections.

From 1 July 2011 patients in remote, regional and outer metropolitan Australia will have better access to specialists through new investments by the Australian Government in telehealth consultations via the internet. This new investment will also lead to an expansion of telehealth services on the Medicare Benefits Scheme (MBS), which will be developed following consultation with clinicians and health consumers. The Government is investing over $400 million over four years in telehealth services comprising:

- $352.2 million for Medicare rebates for online consultations, incentives for GPs/specialists to participate and online training; and;
- $50 million so the GP After Hours Helpline can include videoconferencing. The proposed investment of funds to support the costs of online consultations recognises the importance and potential value of telehealth in Australia. While this funding may help overcome some of the reported barriers for providing telehealth services, it is also important to understand other factors impacting on the adoption of telehealth throughout the country.

3.3.5 Barriers to successful telehealth services using videoconferencing

A range of barriers to the successful implementation of telehealth using VC have also been identified through the literature review and the case studies reported. However, no additional barriers, other than those identified by National ICT Australia Ltd in their report „Telemedicine in the context of the National Broadband Network„ were identified in the current literature review. In that report, barriers to telehealth were grouped into seven broad domains including regulatory, technological, health and business systems, interoperability and access issues as well as difficulties translating pilot projects into sustainable programs. For example, technical difficulties emerged as a very significant barrier in the NZ case study previously described.

This highlights the critical importance of ensuring the system is technically reliable if telehealth using VC is to be successfully implemented. That example also demonstrates the importance of systems being user-friendly. While many of the identified barriers can be overcome through the strategies outlined in the preceding paragraphs, issues of adequate infrastructure, reimbursement, legal issues (e.g. medical liability) and the development of telehealth standards and processes to enable systems to interoperate will require intervention at the highest levels including government and industry bodies.

Key barriers identified in the literature and by key stakeholders included:

- Technical difficulties and lack of technical support;
- The geographic location of videoconference systems away from clinical areas made it difficult to access;
- A comprehensive needs assessment was not undertaken prior to implementation of the program and the program failed to adequately address the needs of the telemedicine service;
- The lack of adequate telehealth infrastructure and a shortage of qualified staff;
- The absence of reciprocal licensure and reimbursement agreements with other jurisdictions;
- Physicians„ resistance and a shortage of providers – restricted growth;
- The cost of the technology, payment structures and payment for telemedicine is inconsistent nationwide;
- Medical licensing by state makes it difficult for physicians to provide telemedicine across state lines, because doctors have to maintain licenses in each state;[31]
- Software incompatibility between two or more countries or institutions;
- Internet congestion causing delays or a low frame-rate of the video pictures and interruptions and delays in voice transmission;
- High communication charges and equipment costs;
- Other communication problems like a change of IP address and configuration of the receiving network, a broken cable at the host network and alteration of the cabling at the host site without authorisation;
- Untrained service providers including physicians and staff;
- Poor infrastructure and other logistical challenges;
- Telehealth services are considered time consuming, especially during the early stages of establishment;

- Feedback from GPs felt they did not receive adequate remuneration from the state for the extra time needed for tele-consultations.

3.3.6   Success factors

Important factors associated with successful telehealth services included:

- The telehealth service is specifically designed to meet clinical needs;
- Prior to the implementation of a telehealth service, a thorough needs assessment was performed as a part of the planning process that should include a thorough understanding and documentation of the needs, supported by relevant quantitative data, and achievement of ‚buy-in„ of all stakeholders;
- There is demonstrable organisational support for resource development, technical services, clinical operations and training;
- There are measurable cost and clinical benefits;
- Local telemedicine champions helped overcome common barriers to telemedicine diffusion, such as work flow disruption and reticence to adopt a new technology;
- Central service management and telehealth coordination has been essential in ensuring the telehealth service is easy for regional clinicians to use. The central coordinator is responsible for managing all organisational aspects of the service including training clinicians, booking videoconferences and addressing technical issues;
- The increased usage and adoption of VC is a result of a consultative approach and integration;[55]
- The role of "champions„ both managerial and clinical, was instrumental in the adoption and usage of the VC equipment for telehealth purposes;
- The skills of telehealth site coordinators helped to ensure effective and appropriate use telehealth services;
- Interconnectivity - the diverse networks of all health service providers e.g. Metro/rural, public health services/GPs, public health services/other providers, across state borders etc. must be capable of interconnectivity for VC. It is also important that interconnectivity be seamless to the user;
- Interoperability – there has been considerable investment across the health sector in endpoints and a means to fully leverage those investments by allowing equipment from different vendors to easily interoperate, again in a way seamless to the user;
- Appropriate and sustainable funding models are also required to embed telehealth as normal practice;

- Physicians require sufficient opportunity to use the VC equipment in order to become familiar with, and competent in using the equipment;

- The development of policies and procedures regarding appropriate responses at each site, guidelines for interactions between sites (particularly with respect to provider liability and authority), and resolution of the provider reimbursement issue should be defined at the outset;

- Appropriate change management practices and resources must be made consistently available if telehealth is to be embedded as part of standard service provision in the health sector. This is clearly illustrated both in Queensland and in the Grampians project, both of which have achieved wide take-up and increasing use of telehealth services, principally through the availability of dedicated change management resources to support users in the transition to the standard use of telehealth in service provision.

3.3.7 Strategies for the integration of telehealth

- *A comprehensive project plan* should be developed at the outset. This includes clearly defining the project‚s objectives, how it will be resourced, how it will be implemented and clearly defining the roles and responsibilities of those involved, (e.g. defining who will be responsible for scheduling the VCs, how to access technical support etc.). Importantly, the project‚s goal and timelines must be realistic. The plan should involve at a minimum GPs, specialists and their representative organisations;

- Protocols and processes for scheduling and conducting VCs should be developed. This includes clearly defining how the service will be coordinated, how and in what circumstances the service will be used, how VCs will be conducted, how confidentiality will be preserved, how clinical data will be shared between services and procedures for maintaining records. Importantly, protocols for the referral and transfer of patients must also be easy to use and consider historical well-established referral patterns;

- A comprehensive change management plan should be implemented to overcome initial resistance to the technology and maximise user acceptance. Change management principles that have been effective in implementing telehealth projects include engaging stakeholders in the planning process to create a sense of ownership, clearly communicating with stakeholders at all stages of the project, actively promoting the project to stakeholders and providing adequate training. *Adequate training and continuing education* must be provided for the users of the VC equipment to ensure they are competent and confident with using the equipment. In particular, the provision of training early on in the implementation phase may assist to overcome any resistance to using the equipment;

- The identification and engagement of *champions* within the workplace who will actively promote the service and support clinicians to use it is also effective in promoting the take-up of VC;

- Develop a *communications plan* to promote the project and raise awareness of the project‚s benefits to stakeholders - if clinicians are to use the telehealth service, they must first be aware the service exists;

- Ensure users have sufficient opportunities to use the equipment in order to become competent and confident in its use;

- Integrating the telehealth service into existing work practices so that it becomes a routine part of the health-care service will facilitate its use;

- Evaluate the project"s performance to measure the achievement of objectives and identify the reasons for success and failure. Reasons for failure can then be addressed.

To ensure sustainability as the telehealth projects moves from the pilot to ‚business as usual phase", governance structures need to be changed so that responsibility for project functions is built into existing structures.[56]

3.4   Assessment recommendations

Three recommendations arose out of the assessment of telehealth implementations and stakeholder analysis (Section 3):

AR1   *Based on the stated limited experience with telehealth and the concerns reported in the GP survey, it is important to incorporate incentives and change management strategies to encourage the take-up of telehealth amongst these health professionals. Marketing and communication strategies should be developed once these are available.*

AR2   *Telehealth deployment should be evidence-based. There is currently little evidence regarding telehealth in primary care. To ensure sound investment, a formal and systematic method of development and evaluation should be funded (commencing with clinically specific proof-of-concept demonstrations).*

AR3   *The Australian Government could support telehealth services which are currently being provided and develop a medium to long-term strategy (up to 10 years) which would allow the re-engineering of various processes used by GPs and Specialists*

(such as electronic referral methods, collaborative consultations and shared documentation).

3.5   Summary

The information described in this report could be useful for the planning of GP orientated telehealth services in Australia. While it is reasonable to acknowledge the many examples of telehealth throughout in Australia and internationally; the challenges and pitfalls reported in this field should also be acknowledged. Even though telehealth has been utilised for decades, the take-up of telehealth as a mainstream service is yet to be realised. In the context of establishing telehealth services in general practice, there are very few examples of GP orientated telehealth services reported internationally.

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APPENDIX 1 WEBSITE REFERENCES

The following websites were accessed for relevant publications and reports:

Organisation	Website
ehealth Australia	ehealthaustralia.org
National ehealth Transition Authority (Australia) (NEHTA)	www.nehta.gov.au
Department of Broadband, Communications and the Digital economy (Aust Govt)	www.dbcde.gov.au
The Australian ehealth Research Centre	aehrc.com
Department of Health and Ageing (Australia)	www.health.gov.au
Australian Resource Centre for Healthcare Innovations (ARCHI)	www.archi.net.au
Australasian Telehealth Society	www.aths.org.au
Access Economics	www.accesseconomics.com.au
Royal Australian College of General Practitioners	www.racgp.org.au
Queensland Health	www.health.qld.gov.au
Queensland Statewide Telehealth Services	www.health.qld.gov.au/qhcss/telehealth/
Centre for Online Health, UQ (Australia)	www.uq.edu.au/coh
NSW Health	www.health.nsw.gov.au
Centre for Health Informatics, UNSW	http://www.chi.unsw.edu.au/CHIweb.nsf/page/home
Victorian Department of Health	www.health.vic.gov.au
Royal Children‟s Hospital, Melbourne	www.rch.org.au
Department of Health and Families – Northern Territory	www.health.nt.gov.au
Government of Western Australia - Department of Health	www.health.wa.gov.au
Royal Perth Hospital	www.rph.wa.gov.au
South Australia Health Department	www.health.sa.gov.au
Women‟s and Children‟s Hospital, SA	www.wch.sa.gov.au/
Grampians Rural Health Alliance	www.grampianshealth.org.au
Loddon Mallee Rural Health Alliance	www.lmha.com.au
New Zealand Ministry of Health	www.moh.govt.nz/moh.nsf
Health Canada	www.hc-sc.gc.ca/index-eng.php
Canadian Telehealth Forum	www.cst-sct.org
The Canadian Institute for Health Information	www.cihi.ca
Ontario Telemedicine Network	www.otn.ca
Canadian Agency for drugs and technology in	www.cadth.ca/index.php/en/home

health	
Government of Alberta	www.alberta.ca
ehealth Europe	www.ehealtheurope.net/
National Health Service (UK)	www.nhs.uk
Scottish Centre for Telehealth	www.sct.scot.nhs.uk
Norweigan Centre for Integrated Care and Telemedicine	www.telemed.no/home.81328.en.html
American Telemedicine Association	www.americantelemed.org
U.S. Department of Veterans Affairs	www.va.go
California Telehealth Network	www.caltelehealth.org
UC Davis Centre for Health and Technology	www.ucdmc.ucdavis.edu/cht
Walter Reed Army Medical Centre	www.wramc.amedd.army.mil
Pacific Regional Medical Command Tripler Army Medical Centre	www.tamc.amedd.army.mil
National Institutes of Health	www.nih.gov
Kaiser Permanente	www.kaiserpermanente.org
GlobalMedia	www.globalmedia.com

APPENDIX 2 STAKEHOLDER REGISTER

Name	Organisation	State/Territory
Dr Chris Moy	Arkaba Medical Centre	SA
Dr Jeff Ayton	Australian College of Rural and Remote Medicine (ACCRM)	QLD
Prof Yogi Kanagasingam	Australian eHealth Research Centre	WA
Dr Craig Szucs	Australian General Practice Network	ACT
Brendan Lovelock	Cisco Systems	VIC
Robert De Nicolo	Cisco Systems	VIC
Leslie Apolony	Committee of Presidents of Medical Colleges (CPMC)	NSW
Sylvia Spaseski	Department of Broadband, Communications and the Digital Economy	ACT
Nigel Phipps	Department of Health and Ageing	VIC
Giulio Cerasani	Department of Health and Ageing	ACT
Margaret Simpson	Department of Veteran Affairs	ACT
Anthea Apps	eHealth Strategy Branch - DoHA	ACT
Damien Pentony	eHealth Strategy Branch - DoHA	ACT
Dr Shaun Rudd	Fraser Coast Health Service	QLD
Jackie Plunkett	Health e-Towns Program	NT
Craig Winfield	Health Workforce Reform Section, Workforce Development Branch	ACT
Abdel Rahman Bassal	ICT Services Department of Health	SA
Professor Mukesh Haikerwal	National Clinical Lead - NEHTA	VIC
Dr Andy Bond	National E-Health Transition Authority (NEHTA)	ACT
Dr Leif Hanlen	National ICT Australia (NICTA)	ACT
Leonie Baden	New South Wales Health	NSW
Dr Victoria Wade	PhD Candidate, University of Adelaide; Medical Director, VidCo	SA
Kerry Grimes	Queensland Health	QLD
Andrew Bryett	Queensland Health	QLD
Helen Little	Queensland Health	QLD

Dr Michael Williams	Queensland Health	QLD
Jennylee Wood	Queensland Health	QLD
Anne Emery	Royal Perth Hospital	WA
Beth Sperring	Royal Perth Hospital	WA
Judith Elliott	Royal Perth Hospital	WA
Heather Maclaren	Royal Perth Hospital	WA
Australasian Telehealth Society (ATHS)	Society Executive and Members	All
Kathryn McGuinness	Department of Health	TAS
Alan Hamilton	Western Australia Health Department	WA
Dr Shane Dawson	Wide Bay Division of General Practice	QLD
Dr Michael Sandow	NEHTA Clinical Lead	SA
Dr David Allen	NEHTA Clinical Lead	NSW
Bob Milstein	NEHTA Clinical Lead	VIC
Dr Didier Palmer	NEHTA Clinical Lead	NT