"Telemedicine is perceived to be cost effective by health organisations, with many wishing to implement: But what are the views of staff and patients?"

Aislinn Enright

A dissertation to the University of Dublin, in partial fulfilment of the requirements for the degree of Master of Science in Health Informatics

04/09/2012

Declaration

I declare that the work described in this dissertation is, except where otherwise stated, entirely my own work, and has not been submitted as an exercise for a degree at this or any other university.

Signed: _____

Aislinn Enright

Date: 04/09/2012

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Abstract

Beginning in 2008 we entered and are still going through what is probably the greatest economic crisis in history. Never has the need for effectiveness, efficiency and value for money been so important in health care. As we move forward through these difficult time, politicians, chief executives and managers of health and social care organisations are exploring more innovative solutions to providing care. One such solution is the use of telemedicine within health care.

Telemedicine or Telepsychiatry (as it is known in mental health) has been in use since the inception of the telephone. It uses the telephone and increasingly video conferencing, E-therapy and mobile applications for diagnosis, therapy, follow up, education and pharmacology. Due to the improvements in technology, such as larger data transfer and storage and computer power, this area is growing rapidly in mental health services, especially in rural areas.

The author of this dissertation currently works for a U.K. charitable organisation 'Turning Point' which is currently exploring solutions to help it develop services that improve access, equity, quality and cost-effectiveness. As a consequence the organisation is turning to the use of technology, in particular the use of telemedicine, more specifically telephone, video conferencing, mobile applications and e-therapy, carrying out health assessments, on-going and follow up treatment, in their Improving access to Psychological Therapies (IAPT), recently renamed Talking Therapies services.

It is proposed to undertake a research study to establish what the patients and staff of IAPT services perceptions are of telemedicine in giving or receiving care. Following an extensive literature review a questionnaire was developed to explore staff and patients perceptions about the use of telemedicine in their care. The questionnaire was posted on line and sent

to the service manager of two IAPT (Improving Access to Psychological Therapy) services, who were ask to distribute to their staff and patients. A total of 57 people responded to the questionnaire.

Overall the research has demonstrated that staff and patients have a willingness to use telemedicine solution within IAPT services, but there are some reservations within the various groups as to what type of interventions and what technology they would use. The research highlighted that that both staff and patients would need to have confidence in the solutions, by receiving more information on telemedicine and assistance with accessing solutions. The limitations of the research are highlighted and recommendations are made, based on the findings.

Contents

Abbreviations

BBC – British Broadcasting Corporation

CBT – Cognitive Behavioural Therapy

cCBT – Computerised Cognitive Behavioural Therapy

DEFRA – Department of Environment Foods and Rural Areas

DH – Department of Health (UK)

IAPT – Improving Access to Psychological Therapies

IT – Information Technology

NHS – National Health Service

NICE- National Institute of Clinical Excellence

OCD – Obsessive Compulsive Disorder

OFCOM –Independent Regulator and Competition authority for the UK Communications

Industry.

ONS – Office of National Statistics

PbR – Payment by Results

PTSD- Post Traumatic Stress Disorder

QUIPP - Quality, Improvement, Productivity and Prevention

UK – United Kingdom

USA- United States of America

WHO – World Health Organisation

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1. Introduction

1.1 Overview

"Information technology is not a magic formula that is going to solve all our problems. But it is a powerful force that can and must be harnessed to our global mission of peace and development……….. I urge everyone in a position to make a difference to add his or her energies to this effort."

Kofi Annan (2002) Secretary General, United Nations

The world has changed immeasurably over the last forty years. Computers have now infiltrated and indeed dominate and define all aspects of life. Communication, Health, Education, Travel, Entertainment and even our homes are now structured and defined by computers. Consequently research innovation and delivery in almost every field is computer led. This dissertation will focus on one small, but important area of health delivery, namely telemedicine, which I will shortly define and then develop its therapeutic importance as the basis of this project.

Beginning in 2008 we entered and are still going through what is probably the greatest economic crisis in history. Never have the concepts of effectiveness, efficiency and value for money been so important. As we move forward politicians, chief executives and managers of health and social care organisations are exploring the potential of telemedicine and as Telemedicine is showing that it provides maximum benefit in terms of patient access, value for money and efficient use of resources many are looking to adopt it usage.

The author of this dissertation currently works for a U.K. charitable organisation 'Turning Point' (for further information on Turning Point and the services it provides see www.turning-point.co.uk) which is currently exploring solutions to help it develop services that improve

access, equity, quality and cost-effectiveness. The current emphasis is driven by policies such as the department of health policy "payment by results (PbR)" (DH 2011). The focus of this document emphasises the importance of the outcomes of service provision and their relevance to the current policies of the Department of Health.

As a consequence the organisation is turning to the use of technology in particular the use of telemedicine, more specifically telephone, video conferencing, mobile applications and e-therapy in order to carry out health assessments, provide on-going and follow up treatment within their Improving access to Psychological Therapies (IAPT) services, recently renamed Talking Therapies.

 Previous research has shown that the use of telemedicine, such as video conferencing and e-therapy (Richardson et al 2009, Proudfoot 2004) can improve outcomes and are likely to be cost effective. Along with this the evidence it is shown that patients are also equally satisfied with using telemedicine solutions (Urness et al 2006). However the organisation wishes to explore whether these solutions are something that patients and the organisation could benefit from.

Turning Point have made some attempts to implement telemedicine in the past, where it was found that the services ended up reverting back to face to face interventions. The results of these trials were inconclusive leading to uncertainty as to whether staff and/ or patients were ready and willing to use telemedicine solutions. The aim of this dissertation is to explore and evaluate the effectiveness and value for money of telemedicine in health care.

1.2   Aim

It is proposed to undertake a research study to establish what the patients and staff of IAPT services perceptions are of telemedicine in giving or receiving care. It provides an extensive

literature review of the telemedicine solution and its impact on health care. Following the literature review a questionnaire will be developed and distributed via the internet and paper copies, through 2 services based in Bristol and Derbyshire.

The aim of the research will be to identify and cover areas such as:

1) What are their views on the value and merit of telemedicine?

2) What are the strengths and weaknesses?

3) How easy would it be for them to use and access telemedicine solutions?

Following analysis of the data gathered it is hoped that Turning Point will identify what the next steps are which they will need to take to ensure successful implementation of telemedicine solutions.

2. Background

2.1 What is telemedicine?

Historically clinical care has taken place face to face. Telemedicine is aiming to support current care by increasing access and choice to patients and staff. Telemedicine or telepsychiatry (as it is known in mental health) has been in use since the inception of the telephone. It has used the telephone and increasingly video conferencing, e-therapy and mobile applications for diagnosis, therapy, follow up, education and pharmacology (Wynchank and Fortuin 2010). Due to the improvements in technology, such as larger data transfer and storage and computer power, this area is growing rapidly in mental health services, especially in rural areas. Much of the literature and evidence is from the USA and Australia, where telemedicine/psychiatry has been widely used (Wootton et all 2003).

2.2 Definition of Telemedicine

"A delivery of healthcare and exchange of health care information across distance" using electronic and communication technologies (Wootton et al 1999).

"The delivery of health care services, where distance is a critical factor, by all health care professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment and prevention of disease and injuries, research and evaluation, and for the continuing education of health care providers, all in the interests of advancing the health of individuals and their communities" (WHO1998)

In easy terms telemedicine provides care from a distance. It can be as simple as a health care professional talking to a client over the phone, or speaking to another colleague about a case. Or it can be as complex as surgeon receiving visual and audio information to guide robotic instruments to perform surgery at a distance.

2.3 Types of telemedicine

2.3.1 Telephone

As previously stated the telephone has been used for many years within health care. Phone-based telemedicine is simply telemedicine where the link between the patient's location and that of the medical expertise is by telephone – healthcare by telephone.

2.3.2 Video Conferencing

Video conferencing is being been increasingly used in health care for a variety of reasons such as direct patient care, peer support and peer education. It has seen rapid growth due to such developments as faster bandwidth, better cameras and monitors (Crump 1998).

Video conferencing provides a link that allows audio and visual communication between a patient and clinician, from 2 different locations. This takes place in "real time", therefore allowing both parties to act upon information as they receive it (Norris 2001).

2.3.3 E-Therapy

E-therapy refers to mental health services that are provided via the internet. This can consist of email support, chat rooms, learning and support tools. They can also incorporate video conferencing facilities. They vary in their offerings; some are standalone treatment packages whilst others use the support and guidance of clinicians (Proudfoot 2004).

2.3.4 Mobile phone applications

mHealth is the use of mobile communication technology, such as mobile phones, in assisting with health care. Android and Iphone applications are examples of how mobile phones can be used in health care. These applications are often free or available at very low cost.

Its benefits can be demonstrated in a number ways such as patients obtaining information and support from a health care professional to clinicians accessing information on a patient record (Sepal et al 2003).

2.4 Common Mental Illness

Common mental health disorders are depression, generalised anxiety disorder, panic disorder, obsessive-compulsive disorder (OCD), post-traumatic stress disorder (PTSD) and social anxiety disorder. All of these disorders can impose enormous societal burden because of their high prevalence. The World Health Organisation (WHO) have ranked depression as the most chronic disease after coronary heart disease and depression is the most common disorder contributing to suicide (WHO 2012).

The vast majority (up to 90%) of depressive and anxiety disorders that are diagnosed are treated in primary care. However, many individuals do not seek treatment, are not being diagnosed or if they are diagnosed they often receive inadequate care (NHS Centre for Reviews and Dissemination 2002).

Until recently there was limited choice for treatment and often people were only offered psychotropic medications. This was mainly due to the limited availability of taking therapies (NICE 2011)

In response the UK government pledged the following additional and recurring funds to be allocated to develop IAPT services across the UK:

- £33 million in 2008/09
- a further £70 million to a total of £103 million in 2009/10
- a further £70 million to a total of £173 million in 2010/11

DH (2007)

2.5 Cognitive Behavioural therapy

Cognitive Behavioral Therapy (CBT) is a well-researched and proven therapy approach to aid people with psychological problems. It has become the therapy of choice in the NHS for common mental illness, following recommendations from the National Institute of Clinical Excellence (DH 2004, amended 2007). CBT uses a structure approach to help patients address their problems, and uses homework to allow patients to practice in-between sessions (Wright el al 2002).

CBT works on the assumption that our thoughts, behaviour, mood, environment and body are interlinked and can either hinder or aid us (Marshall et al 1996), illustrated by the following Figure 1:

Figure 1: CBT Assumptions
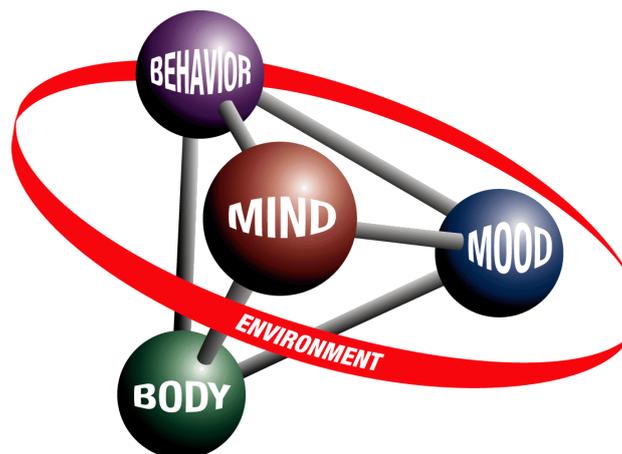
(Padesky C 2012)

CBT uses techniques that challenge a person's negative thoughts and behaviours, with the aim to provide them with better and more positive coping skills. Typically:

- The duration of a session lasts from 30 minutes to an hour
- The number of sessions varies from patient to patient, depending on the nature and severity of the illness, normally anywhere between 5-20 sessions.
- It can be provided individually, in groups, via self-help books and a computer programme

Royal College of Psychiatry UK (2012)

2.6 IAPT/ Talking Therapy services

IAPT is an initiative developed by the Department of Health in the UK (DH 2005), for people with common mental illness such as depression and anxiety and who are classified as adults aged 18-65 years. The aim is for patients to receive fast access to a choice of psychological therapies in addition to "care as Usual". The service is provided in a step care approach as recommended by the National Institute of Clinical Excellence (NICE) guidelines for depression and anxiety (DH 2004, amended 2007). Further information on the guidelines can be found at: http://www.nice.org.uk/CG90. The steps and interventions can vary, but the overarching principle is that a patient gets the least burdensome, effective treatment. Anyone entering the service will receive care from either a low or high intensity workers depending on their need, as outlined below.

Psychological Wellbeing Practitioner (Step 2 worker)

1) Provide up to 5 sessions of low intensity CBT, mainly using guided self-help

2) The worker is a graduate psychologist who receives training and support.

3) Interventions are provided face to face or over the telephone

High Intensity Worker (Step 3 Worker)

1) Are trained therapists in CBT

2) Provide 12-20 sessions of CBT counselling

3) Sessions are face to face

(IAPT 2011)

2.7 Payment by Results

The government in England has developed a payment by results model, which they hope will encourage service providers to increase their activity and improve their outputs. It will allow

commissioners to fund services that are lower in cost, so they can reinvest the surplus (Fairbarin 2007)

Therefore mental health services will:

1) be paid directly for the work they undertake
2) Need to be able to measure what they do, which in turn will improve and inform patient care
3) Use new and innovative ways of working to ensure the best care at the best price for patients

(Sainsbury Centre for Mental Health 2004)

2.8 Turning Point and IAPT

In response to this Turning Point developed Right steps®, a stepped care model for people with common mental illness. It enables health services to purchase a menu of options providing greater personalisation and choice for patients and reconfiguring current service delivery to achieve better outcomes and greater value for money. This model of service delivery relies on a partnership approach across health and social care, between statutory and voluntary sector and between the steps of therapeutic intervention, so the patient experiences a seamless service developed and responsive to their needs.

The model supports the notion of mental well-being and recovery and promotes personal responsibility for lifestyle choices, risk taking and self-management of mental well-being.

Turning Points IAPT service offers a comprehensive assessment, on-going telephone/ face-face support, self-help, signposting, brief and intensive therapy interventions. The service is

directed at providing solution focused, seamless and locally accessible service to people with common mental illness that enhances existing local services and in line the with NICE stepped care model. Turning Point's approach to delivering services within the social care field is based on patient choice and putting the "person" at the heart of what they do.

The interventions aim to:

- Provide information and support which aims to educate and empower the patient to help manage their own condition;
- Provide guidance and support to improve patient compliance with prescribed medication
- Enhance the patient's lifestyle with advice.
- Identify patients 'at risk' and refer to the appropriate services
- Develop a care plan with the patients

Turning Point (2012).

Figure 2: Turning Point's IAPT Model
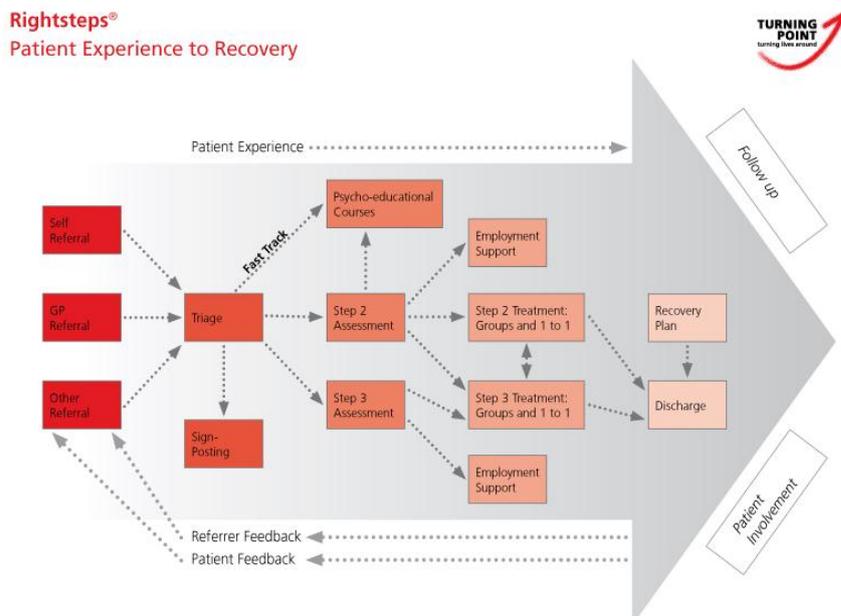
3. Background to Research

3.1 Motivation for Research Topic

As previously stated the author of this dissertation works for an organisation - Turning Point - which is exploring solutions to help it develop services that improve access, equity, quality and cost-effectiveness. The author currently leads a telemedicine group that is exploring various telemedicine solutions. However the author had concerns that unless the organisation engaged clinicians and patients that any telemedicine solutions may fail. This was due to previous experience. The New Business team, which included the author, attempted to bring in a telemedicine solution in the past, which was the use of telephone in proving therapy, they found that the services ended up reverting back to face to face interventions. It was agreed that before the organisation tried to introduce further telemedicine solutions they needed to assess what the patient and staff's views were of various telemedicine solutions. It had not been assessed or clarified to why the telephone failed. There could be several reasons such as lack of training or it is thought that the telephone is not as effective as face to face therapy. The questionnaire will hopefully find out what the views are of patients and staff, and what needs to be in place to implement the technology.

3.2 Research Question

> *"Telemedicine is perceived to be cost effective by health organisations, with many wishing to implement: But what are the views of staff and patient?"*

It is proposed to undertake an exploratory research study to establish what staff and patients think about using telemedicine in giving or receiving care. The research will be focusing on video conferencing, e-therapy, telephone and mobile applications.

The study will aim to identify:

- If and how many of the patients and staff already use telemedicine solutions?

- What telemedicine solutions would they be happy to use and in what context, such as assessment, on-going therapy?

- Is a potential barrier due to lack of access or training/knowledge?

- Are there any demographics that might affect use such as age and gender?

- Fear of new technology

- Institutionalisation

- Fear of change

The data analysis will provide the organisation with insight into what solutions people are prepared to use, what support do they need to provide and to whom when they are implementing telemedicine solutions.

3.3 Outline of Dissertation

The dissertation has been organised as follows:

As already ascertained chapter 1 2, and 3 introduce the background to how the research questions evolved.

Chapter 4 comprises of a literature review:

A literature review was conducted with the aim to review the opinions and views of patients and staff prior to implementation of a telemedicine solution in order to assist with developing

a questionnaire. But the author quickly discovered that most existing research was conducted following the implementation of such solutions. Therefore to help develop a questionnaire and answer some sub questions, which had not been researched such as cost-effectiveness - the following was explored within the literature review:

1. What the Benefits and current applications are of telemedicine solutions
2. Patient and staff satisfaction in using telemedicine solutions
3. A review of the cost effectiveness of solutions
4. What are the barriers to successful implementation of telemedicine solutions

Chapter 5 discusses the research methodology, including sample, duration and implementation of the research

Chapter 6 analyses the results

And finally chapter 7 provides a summary, looks at what the limitations of the study were and what gaps were identified which would benefit from future research.

4. Telemedicine – Literature review

4. 1 the technology.

For the purpose of this paper the technology that is being used is video conferencing, telephone, E-therapy and mobile applications. All of these technologies are or are growing in healthcare and therapy services.

4.1.1 Video Conferencing

Video conferencing has been used in business for numerous years and is fast becoming routinely used in mental health throughout the world. The use of video conferencing in mental health has been utilised since the 1960s (Wittson et al 1961). It is helping bring together clinician and patient – visually and aurally – when they would be otherwise separated mainly due to geography.

Video conferencing is a term that has been adopted from the business world. Other words associated with video conferencing are 'videolink', 'television link' and 'videophone' (Mclaren 2003). Video conferencing allows the transmission of sound and moving picture between sites. Video conferencing has seen rapid growth over the last 10 years, mainly due to development and advances in technology including increased bandwidth, higher quality cameras and monitors.

There are 3 main types of video conferencing systems:

- Desktop videoconferencing – this technology allows users to access video conferencing via their PC.
- Set-tops videoconferencing systems – These are placed above a TV monitor in a room and are useful in small boardrooms.
- Integrated Videoconferencing Systems – these systems are used in conference rooms or classrooms, where you have multiple participants.

It is difficult to find out how many people actually use video conferencing, as there are numerous software providers. In 2007 it was reported that Skype, a free video conferencing software had been downloaded by half a billion people but it is thought only 8 million are regular users (Grabham 2007). In a survey carried out by Hewlett Packard (a technology hardware provider), with their staff, they found that 68% of people had not taken part in a

video conference. They had 4532 responses to a web questionnaire, and found that only 3% were regular users of video conferencing (Hirsh et al 2005).

The survey found that the main benefits for people include ease of access, less travelling and the ability to see people, their facial expressions and gestures. However the majority of non-users reported that it can be costly to set up (especially meetings), there is variable quality and reliability, with problems accessing the equipment and the knowledge to use the equipment (Hirsh et al 2005).

Despite the increasing software and access to video conferencing the amount of people who use the systems are still significantly lower than expected. It would seem that video conferencing systems have failed to live up to the high hopes of the 1960s that it would be used in everyday life.

4.1.2 E-Therapy

E-therapy is increasingly emerging as a popular alternative to face to face therapy. There is increasing evidence that e-therapy can be clinically effective and clients are able to develop good therapeutic relationships (Skinner et al 2006). E-therapy refers to health services that are provided via the internet. It allows patients and clinicians to communicate simultaneously (synchronous) and/or time delayed (asynchronous). There are 5 types of communication used in E-therapy:

1) Email – this is the most common way that the therapist communicates with patients.
2) Secure web-based message systems – This is a more secure way of communicating then email, but are limited in use due to high costs.

3) Chat – real time text exchange – Both the clinician and patient need to be online at the same time. They converse to each other through text, which is sent instantly to each other.

4) Video-conferencing – allows the transmission on video and voice via the internet (see 4.1.1).

5) Voice over IP – is the use of audio across the internet, rather like the telephone.

(Manhal-Baugus 2001).

There hasn't been much research into any overall figures that show how many people use e-therapy. But it could be assumed that the percentage is quite high considering the internet is now used by millions of people especially around health care. One paper has estimated that 12.5 million health related searches are made every day across the world (Gunther 2003). And it has been reported by Google, that around 5 million searches are made every month, on information relating to depression (Gibbon 2011). There is a wealth of information that can be obtained from the internet. In typing depression into Google, it returned over 270,000,000 results!

E-therapy is becoming more widely used in IAPT services since a review was carried out by NICE. NICE (2006) recommended the use of e-therapy in addition to or instead of therapy. They have called this e-therapy computerised cognitive behavioural therapy (cCBT). There are no overall figures on the uptake of various cCBT packages. However, in a review of 16 papers, the authors reported that the uptake and drop outs were comparable to other forms of treatment (Kaltenthaler et al 2008).

4.1.3 Telephone

The telephone (phone) is a device that receives and transmits sounds. It was invented in the 1870s by Alexander Graham Bell and is now one of the most used appliances in the

developed world. It has allowed people to communicate with each other separated by large distances, in real time (Bellis 2012). Ofcom, an Independent regulator and competition authority for the UK communications industries (2011) reported that there are 23.8 million people in the UK with a fixed landline.

The telephone comprises of keypad, allowing some to enter the telephone number of the person they are calling, a ringer that notifies someone a call is coming in, a speaker that allows someone to listen to another person, and a microphone that allows them to speak to that person.

There are three types of telephones:

- Landline: This is the original telephone line that uses copper wiring to allow direct access between telephones.
- Mobile Phone: These are wireless phones that use radio frequencies, rather than copper wire.
- Voice over Internet Protocol (VoIP): this telephone system works through an existing internet service.

WiseGeek (2012)

Since the 1990s, the telephone has been widely used in health care. There is increasing evidence that the telephone is effective in the care of people with a long term condition, which includes common mental illness. A review of 65 papers, which interviewed more than 142,000 participants between them, found there was good evidence to support proactive telephone follow up and therapy. The review also found that using the telephone can improve clinical outcomes and reduce costs, by reducing unplanned hospital admissions. Overall it was found that patients and staff welcome the use of the telephone (Singh 2006).

4.1.4 Mobile Applications

Mobile phones are fast becoming viewed as handheld computers, with the latest mobile generation of smartphones. Mobile phones are owned by 91% of the UK population (Ofcom 2011). However in order to use mobile phone applications you need a phone called a 'smart phone'. One in three people now own a smart phone in the UK, which allows access to these applications (BBC 2011). It is believed that smartphones are the latest technology success, capturing subscribers from school children to older people.

Smartphones allow the use of mobile applications (or apps), which consist of software which is either pre-installed on a mobile phone or consumers can download via various mobile provider platforms. They are widely used as they provide basic services such a messaging, through to more complex applications such as games and music (MMA 2008). These mobile phone applications allow users to engage in the same way as their computers, but they have the advantage of being mobile, giving users the opportunity to use the applications whilst on the go. These applications are often free or available at very low cost.

It is apparent that smartphones are going to play a significant role in health care. There are already numerous examples how these applications can be used in health care. One article reported that in 2010 there were nearly 8,000 health applications (Dolan 2010). Also there is an increase in sophisticated apps for the mental health field. Many of these applications are used to support therapy. They can assist users to track their thoughts, moods and experiences, which can then be relayed to their therapist (Trudeau 2010). Several of these applications have not been individually researched but there is increasing evidence that mobile applications can support health care in data collection, off-site diagnosis, information sharing and improving patient's adherence to treatment (Boulos 2011).

It is predicted that smartphones will give the advantage over other technologies in healthcare due to their computing power to support multimedia applications and their uninterrupted data stream (Free et al 2010).

4. 2 Current Climate

The UK government is showing commitment on the subject of telehealth/ telemedicine and seems to correspond with the aim to save £20bn by 2013/14 under the Quality, Innovation, Productivity and Prevention (QIPP) programme. Recent news on this subject centres on the publication of the 'Whole Systems Demonstrator Programme: Headline Findings'. The report suggested that three million people could benefit from telemedicine/telecare over the next five years (DH 2011), which organisations having committed to the delivery of this target. The funding for the programme is yet to be announced.

There is broad agreement that this is not going to be met by simply moving managers around the system. It will be achieved by transforming models of care that are preventative and integrated. This is also a significant challenge. Many of the current ways of treating patients have been based on treating illness rather than managing better health. The NHS management recognise the size and scale of the challenge upon them and have recently published a series of commitments to drive the adoption of telehealth/telemedicine innovation:

- Developing a tariff for assistive technologies (telecare) that, like Australia and the US, would incentivise rather than block their rapid spread

- Continuing work on tariff development, especially in relation to payment for outcomes, since an outcomes focus enables an innovative, cost-effective means of delivering outcomes to be incentivised directly through the tariff

- They will develop and publish an innovation scorecard to track compliance with Nice technology appraisals

- The NHS operating framework asks the NHS to prioritise the adoption and spread of effective innovation and good practice

- Clinical commissioning groups will be under a duty to seek out and adopt best practice, and promote innovation

- Accelerate the use of assistive technologies in the NHS, aiming to improve at least 3 million lives over the next five years.

- A requirement for the NHS to work towards reducing inappropriate face-to-face contacts and to switch to higher quality, more convenient, lower cost alternatives

(DH 2011 – Long Term conditions Work Stream)

The timing for many of these initiatives over the next eight months means that it is likely that the NHS appetite for telehealth or telemedicine will appear toward the end of 2012 and grow into 2013.

4.3 Benefits of using Telemedicine

Several benefits have been identified when telemedicine/telepsychiatry services are introduced into a care delivery system.

- Improved access to care;

- Provision of a higher level of care locally or in a more timely fashion;

- Timely Medication management;

- Improved continuity of care;

- Improved treatment compliance

- Coordination of care.

- Cost Savings

(McLaren 20093)

4.4 Areas of application:

Telemedicine has been used within mental health services since the 1960s, but there was slow adoption until the 1990s. In America and Australia it became routine practice to offer telemedicine, due to the numerous remote locations (Norman 2006). Telemedicine is now growing in the UK and it is thought that mental health services such as IAPT are well suited to the area of telemedicine, as there is limited need for physical tests and hands on care (Wootton et al 2003, McLaren 2003). Areas of application can be broken into 2 sections - diagnosis and intervention.

There are very few health and social care services being provided today that cannot be offered through telemedicine technologies. Clinical applications include diagnostic and therapeutic modalities that are provided to all ages. Services can be provided for a broad range of diagnoses. Treatment limitations are more likely to depend on the specific patient's need versus diagnosis (Hailey et al 2002). There is strong evidence that telemedicine can be used for people with mild-moderate common mental illness, but may not be suitable for someone with severe depression, who may be at high risk to suicide (Richardson et al 2009)

In a review of 72 articles, it was reported that telemedicine could be used to provide a wide range of mental health services (Norman 2006). There are several areas that have been reviewed and identified where telemedicine can be applied, to name a few:

- Psychological assessments/treatments
- Clinics e.g. outpatients
- Education for patients
- Therapy sessions
- Peer support
- On-going support

(McLaren 2003, Richardson et al 2009)

4.5 Patient Satisfaction

4.5.1 Video Conferencing

Overall the general consensus is that patients and clinicians are satisfied with using video conferencing and have felt that video conferencing is as good as face to face (Wootton el al 2003: Monnier et al 2003). Many patients report preferring telepsychiatry to in-person appointments, because travel time, time off from work, and child care is not an issue with telepsychiatry (Monnier et al 2003). However there have been critics, such as Mair and Whitten (2000) who carried out a systematic review of 32 studies and found that many of the papers have used low sample sizes, low response rates, variation in selection criteria and most have been conducted via post-encounter surveys. Other papers have also cited a dearth of rigorous methodologies (Monnier et al 2003, Norman 2006, Wootton 2006). However a more recent review that examined papers from April 2003 to July 2008, found that many of the previous shortcomings of research papers have been addressed. This is mainly due to the ever increasing improvement of video conferencing (Richardson et al 2009).

In a review by Richardson et al (2009) they discuss patient satisfaction, which they believe is a simple step to measure. Two of the areas they explored were 1) does poor quality equipment affect patient satisfaction 2) patients ability to manage the equipment.

Generally papers have found patients rate the therapeutic relationship as good as face to face, despite the quality of the video conferencing, supporting it is the attitudes to therapy that affect outcomes rather than the technology (Simpson 2005). However some papers have begun to provide recommendation on what the minimal standards that the equipment should have to ensure satisfaction, but this has yet to be researched (Major 2005,

Richardson 2009). Major (2005) believes that if certain steps are taken when using video conferencing, the technology is not even noticeable to the people using it.

On the other hand, if people are not shown how to manage the technology this can lead to dissatisfaction. This is known as technological illiteracy – lack of knowledge and limited exposure to technology (Shore et al 2007). However Shore et al (2007) believe that this can be addressed with education and early on site support.

4.5.2 E-Therapy

Many clients and therapists report that they like the convenience of on-line therapy. It can benefit several groups of people such as those with limited mobility, living in remote areas, lack of access to appropriate therapist, people working, to name few (Rochlen et al 2004). E-therapy is also very beneficial to people who may feel stigmatised. This would be especially useful in mental health, where many people still regard it as stigmatising to have a mental health issue. It is reported that they are more likely to use on-line help, where they can't be physically seen by the therapist (Mitchell et al 1998).

Many of the studies are conflicted. Some studies have suggested telemedicine is difficult to rate as current studies report satisfaction on those who complete treatment but there is limited research and evidence on the people who do not join or drop out of using e-therapy. Further work would need to be done (Waller et al 2009) especially if the dropout rates are high, as one review found that only 56% completed a full course of therapy. They did explore the reasons for a 44% dropout. They reported that the dropout rates were not due to the technology but more to do with peoples' personal circumstances, which would also apply to face to face drop outs. They also found that the therapists were less likely to embrace the technology (Kaltenthaler 2008).

However a review of 22 randomised control trials, found that generally patients were satisfied and adhered to e-therapy, despite the reduced face to face contact (Andrews et al 2010). The review reported that all 22 studies measured both, adherence and satisfaction. 10 of the studies had a median of 86% patients that reported they were satisfied of very satisfied. The downside to most of these studies is that patients were recruited via a marketing strategy via the media. The question must be asked would the same results apply to patients who have gone to seek professional help with the expectation that they will receive face to face treatment from medical staff.

4.5.3 Telephone

The telephone has been increasingly used within Step 2 of IAPT services. It increases the access for patients whom would have difficulty attending a face to face appointment due to social, physical, psychological and economic reasons, for example money to travel or had mobility issues(Lovell 2010).

In a literature review 10 studies out of 13 were identified as having used telephone to provide psychotherapy (Bee et al 2008). In one of the studies it was found that eighty-three per cent of users expressed a positive attitude towards the use of telephone in their therapy, with seventy five per cent stating they would like to continue using the telephone in the future for their treatment (Miller 2002).

The main opposition to using the telephone and any other telemedicine solution seems to be from clinicians who believe therapy should be delivered face to face. It is thought that the loss of non-verbal cues leads to a breakdown in the therapeutic alliance and is a threat to staff. (Lovell 2010). But studies are showing that this is not a barrier and several studies show the acceptance of telephone interventions by users.

4.5.4 Mobile Applications

There is an abundance of research papers that examine the use of the mobile phone, but there are limited studies when it comes to the use of mobile applications in mental health. It could be argued that people are more than happy to use mobile applications with one in three people now owing a smart phone in the UK, which allows access to these applications (BBC 2011). With such a large number of smart phone owners, mobile applications are a powerful tool to help support patients in-between therapy sessions as well as in the case when there is a lack of face to face contact. Gasser et al (2006) state that due to the fact people carry them around all the time, mobile devices have the ability to facilitate interaction, at the right time and is convenient to the user.

To test this they carried out a study on a mobile application for motivational coaching, a technique similar to CBT. It was a small study of 40 people, which found that the overall satisfaction rate was 6.8 (0-9). This would indicate user satisfaction with using a mobile application. A key reason for dissatisfaction was due to the limited flexibility of the application, such as allowing retrospective data entry (Gasser et al 2006)
A fairly large study looked at people's attitudes to whether they would like to use a mobile application to manage their mood, health and anxiety. The study had 455 respondents, who were all voluntary. Over 76% of respondents stated they would be definitely interested in using an application on their phone (Proudfoot et al 2010).

4.6 Cost

"Information technology is extremely cost-effective compared with other forms of capital. Modest yet key investments in basic education and access can achieve remarkable results"

Kofi Annan (2002) Secretary General, United Nations

When discussing cost it is assumed that using Telemedicine will be cheaper than face to face contact. In 2003 it was argued that there had been limited studies which aimed to measure this (Wootton el al 2003). An early review carried out in 2002, selected 55 papers

from 612 that showed cost benefit data. They concluded that there was limited support that telemedicine solutions offered a cost-effective solution in healthcare (Whitten 2002). Since then a review in 2010 of 1593 papers also stated that there was limited evidence of cost-effectiveness (Ekeland 2010). So despite telemedicine programs having been implemented several decades ago there is still limited evidence of its cost effectiveness. There have been several reasons cited to why it is difficult to measure cost-effectiveness and the limitation of studies to date. Despite these reviews there are many advocates of telemedicine, including the NHS in England who is proposing the wider use of telemedicine (see 4.2).

Overall the main difficulty faced by researching the cost of telemedicine solutions is that no sooner is a research paper complete the cost of the Telemedicine solution can decrease thus rendering the research invalid (Richardson et al 2009, Hyler et al 2003).

All of the papers discussed so far have looked at the cost-effectiveness, and it is rare to find a paper that analyses the economic cost and benefits, such as reduction in hospital admissions. Until more telemedicine solutions are analysed using economic standards it is difficult to tell if the solution is a worthwhile health care investment (Whitten 2002). So health economists believe that they should be involved early in a project to help design and evaluate a telemedicine solution, to ensure that the necessary data is collected from the start. A health economist will compare economic cost and benefits to understand if a service is economically justified and is a good alternative to current care (Da´valos 2009).

Despite the lack of evidence and consistency in the research on cost effectiveness, it is likely that more and more organisations like Turning Point will still have to adopt telemedicine solutions despite the limited research. So it might be more effective for them to learn from previous studies as to what can drive up or down costs.

4.7 What are the barriers to successful implementation of telemedicine solutions

Many papers have reported that much of the research into telemedicine is limited as often the research is based on pilot sites, which often do not continue after the pilot is finished (Mair et al 2000), making it difficult to understand what the barriers could be. According to Wootton el (1999) there are numerous examples where telemedicine has failed because it was not integrated into the health and business environment. The evidence suggests that if patients and staff are consulted and have confidence in the technology it is more likely to succeed (Norman 2006).

Peppard et al (2008) examined numerous technology projects and found that they were 'designed to fail!' This is often because of the project management of implementing the technology. Project management in implementation technology is not the same as project management in construction; in construction it is easy to see the end result - a building. However when using technology such as the telemedicine solutions, project requirements often change and these changes are due to organisational needs. Therefore changes need to be both at an organisational and individual level and the technology will need to be designed taking these factors into consideration.

An example of where a project could fail within organisations is just because they have one successful site which has good clinical outcomes and cost effective it does not mean that this will be the case in another site, where accessibility and quality of the service differs (Whitten 2002). Such as service in a remote area of Wales might not generate the same results as a service provided in the city of London, where people are able to access more face to face than a rural area such as Wales.

The focus needs to move from cost of equipment and connectivity. For telemedicine to be successful the focus needs to ensure that it is accessible, provides no hindrance to staff or patients and should complement current care. In a review of patient satisfaction it was recommended that before an organisation implemented a telemedicine solution they need to be clear on what types of consultation will benefit, what were user's perceptions of using telemedicine solutions and what could be the limitations, such as lack of access and knowledge (Mair 2000).

Many telemedicine solutions are implemented with limited training, often nothing is offered beyond the basic switch on and off (Yellowlees 1997). Even ten years on it is reported that many telemedicine projects fail as users are not shown how to manage the technology, which leads to dissatisfaction and gradual reduction in use (Shore et al 2007).

4.8 Demographic Issues Affecting Telemedicine

4.8.1 Urban / Rural

There have been numerous studies reviewing the use of telemedicine between rural and urban communities. Studies have found that both urban and rural patients are equally receptive to using telemedicine solutions. A survey of 243 patients reviewed the perceptions and attitudes of urban and rural patients and how receptive they were to receiving care via telemedicine solutions. They found no statistical differences between urban and rural patients in regard to comfort or satisfaction in use (Grubaugh et al 2008).

The majority of studies indicate that rural populations would be highly likely to benefit more from using telemedicine solutions. This is due to their unique challenges such as isolated communities and it has been reported that people within rural areas are less likely to access mental health services often due to lack of appropriate health care services (Rost et al 2002). Research has also indicated that by using telemedicine solutions in rural areas it can benefit staff and patients as it can be less expensive by reducing travel time and costs, and

for patients reduces the need to take time off work (Jones et al 2001).   Therefore telemedicine is believed to be solution to provide services for patients in rural location to improve access, by allowing clinicians in urban areas to deliver care remotely.

Even if organisations decide that a particular rural area would benefit from Telemedicine they need to keep in mind that access to the internet in some areas can still be limited and often poor with slow broadband connections. Two recent reports show that 15% of rural people have slow broadband connection (DEFRA 2012) and a report of 1500 UK small business reveal that 57% claim that the slow quality of their internet affects their business (Hunter 2012), both these reports support the belief that there is still a urban/rural divide in internet access. This in turn can affect the usage and satisfaction in a patient's experience using telemedicine.

4.8.2 Age

It is perceived that older adults are less likely to embrace technology and have had limited exposure, therefore would be unlikely to benefit from telemedicine solutions. This is supported by the Office of National Statistics (ONS) in the UK. They completed a survey looking at access to the internet and reported that over 21 million households in the UK had accessed to the internet. Of this number:

- Households with an adult over the age of 65 were the least likely to have internet access at 36%

- Households with children had the highest access to the internet, 95%

- 76% of Households with an adult aged 16-64 years had access to the internet.

(ONS 2012)

This theme continues in the usage of smart phones and mobile applications. A recent survey conducted by YouGov 2011), which asked 2066 consumer about smart phone usage they found the over 48% of mobile phone users were over 55 but only 14% of over 55 had a

smart phone. ONS (2012) found there had been noticeable increase amongst all age groups with the use of the internet via smart phones. However the fast growing use of this technology is amongst the 16-24 year olds, with internet usage over a mobile phone increasing from 44% to 71% in a year (ONS 2012)

Older adults are increasingly at a disadvantage when it comes to the use of technology, due to lack of access and their ability to use it, with them often not understanding the full benefits it can offer. However some believe this is not the case. A literature review found that older people were willing to use technology, but the support and training they receive, as well as ease of access can all contribute to how well they embrace the technology (Czaja 2003). Organisations therefore need to consider how they roll out a telemedicine solutions and ensure that they give training and guidance in its usage.

4.8.3 Gender

Generally men are more likely to use technology than women but there does not appear to be any significant differences. A survey by the ONS (2011) found that 86.1% of men used the internet compared to 81% of women. A similar theme is found with the usage of smart phones with 41% of women owning a smart phone compared to 56% of men (YouGov 2011). ONS (20120 also found that of these smart phone users men were more likely to access the internet via their mobile phone, 37% in comparison to 25% of women.

With regards to telemedicine there are limited studies that examine if there are differences between telemedicine and gender. However the studies that have been done have found that there is no difference in attitudes and willingness to use telemedicine solutions with mental health (Grubaugh et al 2008, Eikelboom et al 2005).

4.9 Ethical and Legal Issues

Historically telemedicine can potentially cause many legal and ethical issues, including security and privacy. Each of the technologies discussed pose many questions:

Video conferencing: It is thought that confidentiality could be breached as it is possible for someone else to watch the consultation but not be visible on the video screen (Norman 2006).

E-therapy: Patients should be guided in their choice of e-therapies, by advising them to ensure they access services that are provided by accredited and trained providers. There is a risk of them providing confidential information to bogus providers (Proudfoot 2004).

All of the technologies could put patients at risk if they use unsecure networks. For example the electronic transfer of patient data, which could put patient's data significantly at risk from potential infringements of their privacy (Hyler et al 2004).

Therefore health providers need to ensure they have the correct governance in place to reduce these risks. In order to address this, the department of health in England has set up a connected health department who have overall responsibility to manage the IT infra-structure across the NHS. Within in this department a health informatics review board has been set up, with one of their aims is to make sure that the governance of informatics within the NHS is appropriate, supported by the right IT infra-structure and management structure (DH 2008).

4.9 Conclusion

More and more people are using technology in their everyday life and therefore it is feasible for health care to use various interventions such as telephone, video conferencing, telephone and e-therapy in delivering care. There is an abundance of evidence that

suggests if the technology is accessible and reliable that patient and staff would be willing to use telemedicine interventions.

There is enormous potential for telemedicine to improve access and choice for patients in a cost effective manner. But cost effectiveness of telemedicine is dependent on the cost of the equipment and usage. Although It is difficult to assess the cost due to the rapid change in technology, it is believed that organisations like Turning Point can ensure that implementation is successful and cost effective. To do this they will need to integrate services within current health care provision, determine if the technology will make any improvements and review various costs of equipment available.

Yellowlees (1997) set out seven core principles to successful implementation, of which most are still recommended today and outlined in the literature review:

1) Sites should be selected logically

2) Users must be involved and own the systems

3) Technology should be integrated into clinical care and user friendly

4) Support should be from bottom up

5) Evaluation should be user friendly and clinically appropriate

6) Communication amongst users and management should be open and shared

The aim of the literature review was to help the development of a questionnaire to ask patient and staff their views on using telemedicine solutions. As there limited papers that address the views of patients and staff prior to the implementation of telemedicine the author has used the literature review to inform the questionnaire. Areas that will be addressed include current usage, views on how happy they would be to use telemedicine, what areas of care do they envisage telemedicine could be used and what would be needed to help them.

It is believed that if staff and patients are involved prior to implementation than there is a strong chance that the implementation will be successful.

5. Research

The World Health Organisation recommends that patient satisfaction should be measured, but this has been inconsistently applied in health care settings (Slade et al 2010). The primary aim of this research was to determine user's views on using telemedicine in giving or receiving care.

The aim of the next following chapters is to look at the research methodology, questionnaire design and development, results and future recommendations.

5.1 Research Methodology

Following a comprehensive literature review the next step is to design the research project. The research originally was intend to use a mixture of qualitative (semi-structured interviews) and quantitative (questionnaire). Both types are research models are widely used within health care to help understand and explain complex, real world situations (Bradley et al 2007). However due to time constraints and the inability to attend various geographical areas, it was decided with the service managers that the questionnaire be distributed directly.

The aim of the research will be to identify and cover areas such as:

4) What are their views on the value and merit of telemedicine?
5) What are the strengths and weaknesses?
6) How easy would it be for them to use and access telemedicine solutions?

Following analysis of the data gathered it is hoped that Turning Point will identify what the next steps they will need to take to ensure successful implementation of telemedicine solutions.

5.2 Study Design

It was hoped that in the first phase an in depth semi-structure interview will be designed and conducted to capture data from a sample of clinical staff, patients and IT staff. The interview would consist of clear, non-technical terms words. However due to time constraints and the difficulty to access people, the research went straight to sending out a questionnaire. Also as Turning Point would like to replicate this work to other service sites, such as drug and alcohol services they wanted to find a solution that was easy to replicate.

The questionnaire was developed in response to the literature review which highlighted several areas that should be addressed before implementing a telemedicine solution. However before developing the questionnaires, the advantages and disadvantages of using questionnaires were considered (Gillham 2004).

5.2.1 Advantages to questionnaires:

1) They allow the researcher to get information quickly and target a large amount of people, which would be beneficial for Turning Point as they want to use the questionnaire at later stage for other services.

2) Rather than arranging times to talk or meet, respondents can carry answer or fill out the questionnaire in their own time. Many services are currently stretched and would not have the time to interview or question people.

3) It allows for anonymity, which is beneficial if the subject topic is of a sensitive nature.

4) There is evidence that interviews can get different answers, based in gender, race etc., whereas this bias is removed in a questionnaire

5) By using a questionnaire it can help provide suggestive data for a hypothesis. As previously stated there are limited studies and questionnaires that ask the views of patients prior to using telemedicine solutions. Therefore it is hoped that the questionnaire use may be developed further so that a more in-depth study could be carried out.

Although the advantages to using a questionnaire present a strong reason to use one, the disadvantages need to be considered to help improve the quality and response to the questionnaire.

5.2.2 Disadvantages for questionnaires

1) Questionnaires can yield a low response rate, but this can improve if the respondents are captivated. If possible staff will be encouraged to ask patients to fill out the questionnaire after a therapy session; however this may be difficult due to their workload demands.

2) It is difficult to motivate people to respond. It is hoped that service managers within the IAPT services ensure that the staff understand the need for the data, which in turn they pass this on to their patients. The initial information sheet will also explain the reasoning behind the questionnaire (Appendix 3).

3) There is debate over how long a questionnaire should be. However due to financial constraints the questionnaire will be limited, anyhow, as survey monkey charge for more than 10 questions. However it is possible to ensure that one survey monkey question can contain more than one question. For instance question 10, asks about gender and age, therefore making it 2 questions

4) It is difficult to know if people have understood the questionnaire. Therefore there will be the option for people to comment and leave feedback. It is hoped by doing this it will indicate people's thoughts.

5) Questionnaires can often be incomplete. If this is a major issue than a review of the questionnaire will be done to look at possible causes.

6) Questionnaire development can be poor. Prior to sending out the questionnaire, 2 service managers and a clinical lead were asked to review the questionnaire. A few changes were made. But generally it was felt that the questionnaire would be able to give the data that we required.

After reviewing the disadvantages it could be thought that questionnaires are not a productive way of conducting research. But Gillham (2004) believes that preparation is the key and that these disadvantages are there to serve as pointers. If these pointers are addressed then it can lead to a good questionnaire.

5.3 Ethics approval

Ethical approval to conduct the research was sought from Turning Point and Trinity College, Dublin. Turning Point's clinical governance department have an ethics committee which meets monthly to consider all research proposals. Alongside Turning Point's documentation, a research proposal was submitted (Appendix 4). Turning Point requested that one change was made to the consent form. This request was to change the statement "This research **may** involve viewing materials via a computer monitor.." to "This research **will** involve viewing materials via a computer monitor.."

Trinity College, Dublin also made one request to change the consent button on the survey monkey site, to ensure that participants could not continue unless they had consented to the research.

Once these changes were made both Turning Point and Trinity College Dublin granted Ethical approval to carry out the research.

5.4 Setting and sample

Two sites were identified -The staff and patient numbers for each service are set out in figure 3.

Site	Staff	Patient Entering therapy per quarter
Bristol	16	1362
Derbyshire	10	812

The chosen sites changed from the original proposal sites. This was because much of the research has been conducted in rural areas and it is suggested that rural areas would benefit more from telemedicine. Therefore Bristol, a city and Derbyshire, predominately a rural area, were chosen.

5.5 Recruitment Process

A meeting was arranged with the National Talking Therapies manager and the 2 service managers from Bristol and Derbyshire. They were briefed on the research, including the reasoning behind it. All three were signed up and it was decided that each service manager would inform staff at their team meetings and a random sample of people would be recruited. Recruitment would be voluntary and is based on gaining informed consent from participants (appendix 5). The consent procedures emphasise that participants will not be affected in any way if they refuse to participate in the research.

Due to the large population it was decided to use random sampling. This is where anyone in the target population has an equal chance of been selected. This is seen as the traditional form of sampling (StatPac 2012). However the issue with this type of sampling is that certain populations within the sample may be missed. For example younger people may end up represented, whereas older people aren't. This is known as sampling error. A way to address this is to ensure that there is a large enough sample from the population. The aim of this is to get 5% of the population, which would be around 100 questionnaires completed.

5.6 Inclusion and exclusion criteria

All staff and patients who were in Bristol or Derbyshire services were thought as potential participants. The service is for adults who are aged from 18 and above. The inclusion criteria relayed to the staff was that the patient is able to give consent and was able to fill out the questionnaire. So they needed literacy in English. No other criteria were identified.

5.7 Questionnaire design

In the previous chapters a literature review was conducted and from the beginning it was apparent that there are limited studies that ask patient/therapist their views on Telemedicine prior to the use of a telemedicine system. Therefore it was decided to develop a questionnaire. As previously discussed an online survey was used as a means of delivery, as well as paper copies. There are numerous online survey tools but it was decided to use survey monkey, mainly due to the fact it was free, it is a popular online survey tool and works well for small surveys (www.surveymonkey.com).

5.7.1 Questionnaire

The questionnaire consists of 5 categories. Question 1 asked what their current usage of telemedicine was. Questions 2 explored their satisfaction and willingness to use telemedicine in their care. Question 3 and 4 explored in which interventions and disease areas would they use telemedicine solutions. Question 5 was used to explore their comfort of use. Question 6 allowed for respondents to record any comments that they may have (appendix 6 for full copy of the questionnaire). And finally questions 7 and 8 collected demographic data.

5.8 Duration of the Study

It was decided to run the study for two months. This time scale was decided on due to the limited time after that the researcher would have to analyse the results before the

dissertation submissions. However due to the low uptake, which is explained in the discussion, the study was extended for one more month.

5.9 Collection, Organisation and Analysis of Data

The questionnaire was sent to all members of staff in the service by email. They were asked to fill it out themselves. They in turn were asked to either give a copy to the patients as a hard copy or ask the patient to fill out the questionnaire on line by using https://www.surveymonkey.com/s/9N6YB5N. Both the hardcopy and online copy included an information sheet and consent form (Appendix 3 & 5).

The data was collected either by survey monkey or hardcopy, which were sent to the researcher. All of the answers from the questions apart from question 6 were entered into an excel spread sheet. It was envisaged after the collection of the questionnaires that a standard statistical packages may be used to help examine any cross-tabulation, or relationships, or categories which emerges. Due to the amount of data collected it was decided to use excel spread sheets rather than an elaborate statistical analysis and a statistical analysis system.

Question 6 only had 3 responses which were quickly analysed, and further mentioned in the results.

5.10 Preliminary discussion on results: Independence of Data, the Chi-Square Test

As the questionnaires use multi- variable e.g. Rural Urban, Male, Female, Telephone, Internet, Video, Mobile the Chi-Square Test to test for independence, will be used. For example in the case of Male and Female respondents to check whether their responses are independent of each other or that they are equally likely to make similar response. The Chi-square Test however, cannot answer questions as to why, for example, Males would make

different choices to Females or indeed why rural dwellers would select different media devices to be chosen by those of urban dwellers.

The Chi-Square test is reasonably intuitive and calculates a statistic using the formula:

Sum of $\dfrac{(\text{Observed - Expected})^2}{\text{Expected}}$

The Chi-Square test bears resemblance to standard deviation. The difference between observed and expected is squared so that positives and negatives do not cancel each other out. In a perfect situation the computed value would equal 0. The bigger the calculated value, the more likely that the variables are not independent and that there is an association between the variables. For example, in making a career choice from Nursing, Construction, Fashion etc. it is intuitively likely that Male choice would be different from Female.

To tabulate the test Excel was used and the appropriate Range functions including CHITEST to calculate the probability of the above **Sum** occurring. CHITEST returns the probability of the calculated **Sum.** If the observed were identical to the expected in the spread sheet the value would equal 1, i.e. certainty. N.B. Probability must lie in the interval 0 to 1. Close to 0 means very unlikely. It is usual to reject a connection if the probability is less .05, i.e. 5%. Also for the purposes of mathematical consistency where there was a value of "0" in the observed data it was replaced with "1". This was to ensure there would be no divisions by "0" occurring.

5.10.1 Test One Urban V Rural on Question 1

Urban v Rural response to Media type

	URBAN	RURAL				
Telephone	12	28	40		A	B
Internet	12	21	33		C	D
Video Con	1	3	4	Box	E	F
Mobile Phone	8	15	23		G	H
	33	67	100			

	URBAN	RURAL			O	E	SQ(O-E)
				A	12	13.2	1.44
Telephone	13.2	26.8	40	B	28	26.8	1.44
Internet	10.89	22.11	33	C	12	10.89	1.2321
Video Con	1.32	2.68	4	D	21	22.11	1.2321
Mobile Phone	7.59	15.41	23	E	1	1.32	0.1024
	33	67	100	F	3	2.68	0.1024
				G	8	7.59	0.1681
				H	15	15.41	0.1681

chi_square

df = 3

prob
chi_square =   0.923147707

No significant difference

There is no difference in the urban versus rural selection pattern however it is clear it was a better response from rural respondents.

5.10.2 Test Two Male V Female on Question 2

Male v Female response to differing Media type

	Male	Female				
Telephone	9	26	35		A	B
Internet	6	23	29	Box	C	D
Video Con	1	2	3		E	F
Mobile Phone	3	18	21		G	H
	19	69	88			

	Male	Female			O	E	SQ(O-E)	SQ(O-E)/E
				A	9	7.556818182	2.08277376	0.275615174
Telephone	7.5568182	27.44318182	35	B	26	27.44318182	2.08277376	0.075894034
Internet	6.2613636	22.73863636	29	C	6	6.261363636	0.06831095	0.010909916
Video Con	0.6477273	2.352272727	3	D	23	22.73863636	0.06831095	0.00300418
Mobile Phone	4.5340909	16.46590909	21	E	1	0.647727273	0.124096074	0.191586922
	19	69	88	F	2	2.352272727	0.124096074	0.052755819
				G	3	4.534090909	2.353434917	0.519053315
				H	18	16.46590909	2.353434917	0.142927724

chi_square   1.271747084

df = 3

prob
chi_square =   0.735852691

There was no significant difference from female to male selecting the 4 categories. However there was a difference in the number of female respondents and willingness to select from these categories.

5.10.3 Test Three Male V Female on Question 2

Male v Female observations attitude response to overall satisfaction

	Male	Female				
Negative	13	20	33		A	B
Rare	2	20	22	Box	C	D
Some	11	37	48		E	F
Positive	22	60	82		G	H
	48	137	185			

		O	E	SQ(O-E)	SQ(O-E)/E
		A	13	8.562162162	19.69440467	2.300167213
Male	Female	B	20	24.43783784	19.69440467	0.805898002
Negative	8.562162162	24.43783784	33	C	2	5.708108108	13.75006574	2.408865684
Rare	5.708108108	16.29189189	22	D	20	16.29189189	13.75006574	0.843982137
Some	12.45405405	35.54594595	48	E	11	12.45405405	2.114273192	0.16976586
Positive	21.27567568	60.72432432	82	F	37	35.54594595	2.114273192	0.059480009
	48	137	185	G	22	21.27567568	0.524645727	0.024659416
				H	60	60.72432432	0.524645727	0.008639795

chi_square   6.621458115

df = 3

prob chi_square =   0.084993618

No significant difference

There was no significant difference on male or female responses.

5.10.3 Test Three Age on Question 1

Here, in the first instance the ages have aggregated to produce 3 age groups of reasonable width. Again the test shows no significant differences in the selection of the four telemedicine options by virtue of age.

Attitudinal Response by Age to using all Media			(Age aggregated to 3 groups)						
	18 to 33	34 to 59	60 +						
Telephone	16	25	8	49					
Internet	15	20	4	39				A	B
Video	1	2	1	4		Box		C	D
Mobile	13	12	4	29				E	F
	45	59	17	121				G	H

	18 to 33	34 to 59	60+			O	E	SQ(O-E)	SQ(O-E)/E
					A	16	18.2231405	4.942353664	0.271213058
Telephone	18.22314	23.892562	6.884297521	49	B	25	23.89256198	1.22641896	0.051330576
Internet	14.504132	19.016529	5.479338843	39	C	8	6.884297521	1.244792022	0.180816128
Video	1.4876033	1.9504132	0.561983471	4	D	15	14.50413223	0.245884844	0.016952744
Mobile	10.785124	14.140496	4.074380165	29	E	20	19.01652893	0.967215354	0.050861824
	45	59	17	121	F	4	5.479338843	2.188443412	0.399399175
					G	1	1.487603306	0.237756984	0.159825528
					H	2	1.950413223	0.002458848	0.001260681
					I	1	0.561983471	0.19185848	0.341395236
					J	13	10.78512397	4.905675842	0.454855768
					K	12	14.14049587	4.58172256	0.324014278
					L	4	4.074380165	0.005532409	0.001357853
								chi_square	1.131659714
								df = 6	

prob
chi_square =   0.894993197

No significant difference

6. Complete Results and Discussion

A total of 57 people completed the questionnaire. Only 5% of respondents (n=3) wrote comments in the free text other comment section. 51% (n=29) accessed the questionnaire

via the website with 49% (n=28) completing the questionnaire on paper. 50.9% (n=29) of respondents were from Derbyshire and 21.1% (n=12) were from Bristol, with 28.1% (n=16) not stating where they were from. The median age group of respondents was 34-42 years (Table 1); most were females (45.6%) although 35.1% did not state if they were male or female. The largest group represented was patients, who were made up 52.6% (n=30) of the people who completed the questionnaire (Table 2).

Table 1: Age of respondents

Age Group	Count	Percentage
16-24	4	7%
25-33	13	22.1%
34-42	14	24.6%
43-51	8	14.0%
52-60	4	7%
Over 60	8	14.0%
Not Stated	6	10.5%
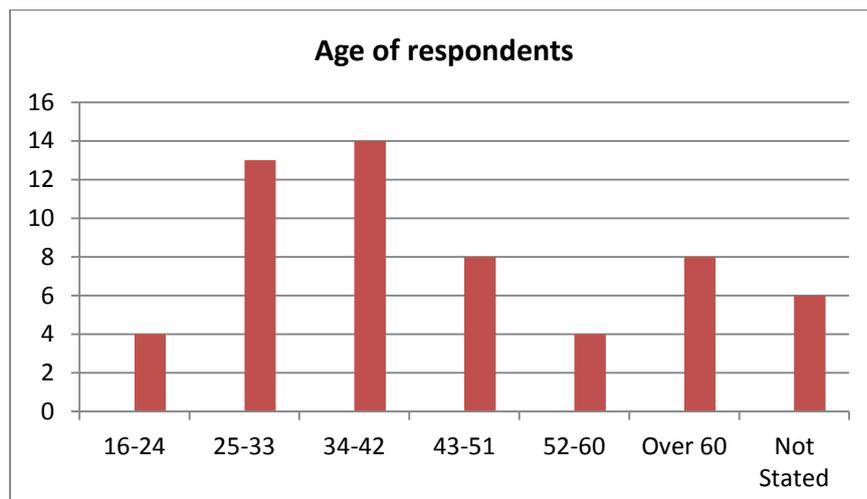
Table 2: Demographics of Respondents

Demographic	Count	Percentage

Patient	30	52.6%
Member of Staff	13	22.8%
Not Stated	14	24.6%
Male	11	19.3%
Female	26	45.6%
Not Stated	20	35.1%
Derbyshire	29	50.9%
Bristol	12	21.1%
Not Stated	16	28.1%

The rest of the questionnaire was broken into three areas:

- Current usage of technology

- How happy staff and patients would be to use Telemedicine solutions in receiving or giving care

- Intervention and disease areas that they felt telemedicine could be used

- Comfort of use

The complete data collection can be found in figure 4 at the end of this chapter.

6.1 Current usage of Technology

The first section looked at current usage of technologies used in telemedicine. The question asked "*Do you use the following at least once a week or more?"* The majority of people use the telephone 87.7% (n=50) and the Internet 70.2% (n=40). However there were only 7% of people who reported they used video conferencing at least once a week (n=4). There were no differences in usage by area. However in the age groups 67.7% (n=21) of respondents under the age of 42 used mobile phone applications versus 40% (n=8) in the older age groups. There were no differences in usage by age with the other technologies. A similar result was found between staff and patients. Patients were more likely to use mobile phone

applications 63.3% (n=19), versus 38.5% of staff (n=5). There were differences between gender and usage. Females were more likely to use the internet 88.5% (n=23) female/ 54.5% (n=6) male and mobile phone applications 69.2% (n=18) female/ 27.2% (n=3) men. The results are outlined in table 3.

Table 3: Do you use the following at least once a week or more?

Answer	Count	Percentage
Telephone	50	87.7%
Internet	40	70.2%
Video Conferencing	4	7%
Mobile Phone Applications	29	50.9%
No Answer	7	12.3%
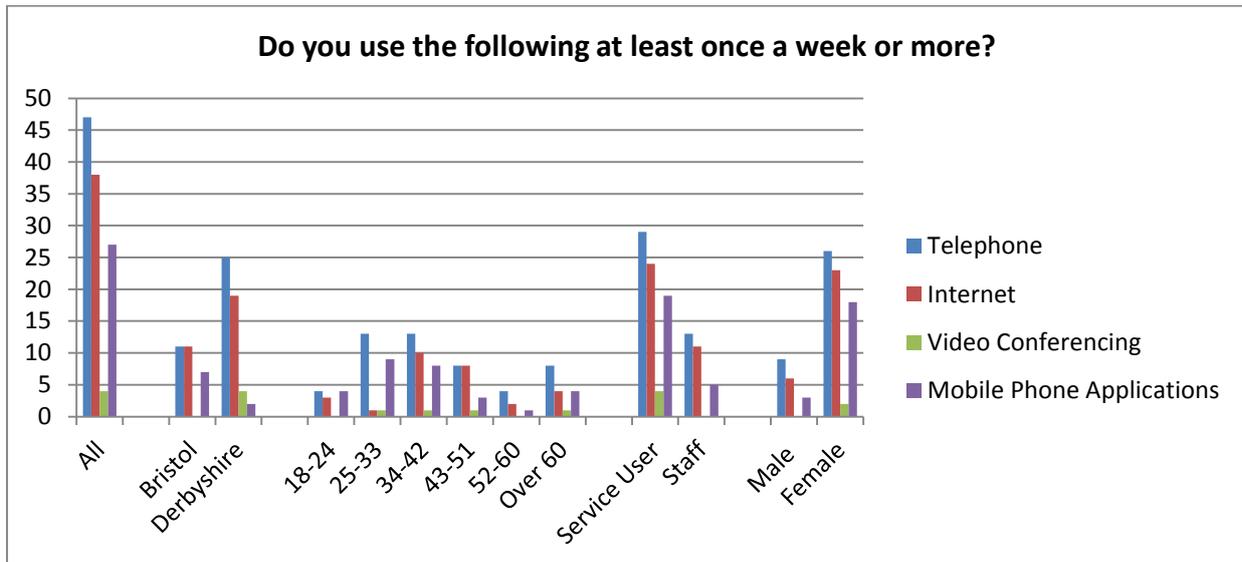
6.2 How happy staff and patients would be to use Telemedicine solutions in receiving or giving care

6.2.1 Face to Face.

Question 2 asked " *On a scale of 0 to 3, where "0" disagree and "3" would be happy to use,*
how would you feel about using the following in receiving/or giving care". The aim of this
question was to ascertain how satisfied staff and patients would be in using various
interventions within their care. This question is broken down into face to face and the various
telemedicine solutions in their care. There were no differences in each of the groups with
regards to face to face and overall 74% (n= 42) of people were happy to use face to face
care (Table 4)

Table 4: On a scale of 0 to 3, where "0" disagree and "3" would be happy to use, how
would you feel about using the following in receiving/or giving care- Face to Face

Answer	Count	Percentage
Disagree	0	0
On rare occasions	5	8.7%
Some of the time	5	8.7%
Would be happy to use	42	73.7%
Not Stated	5	8.7%
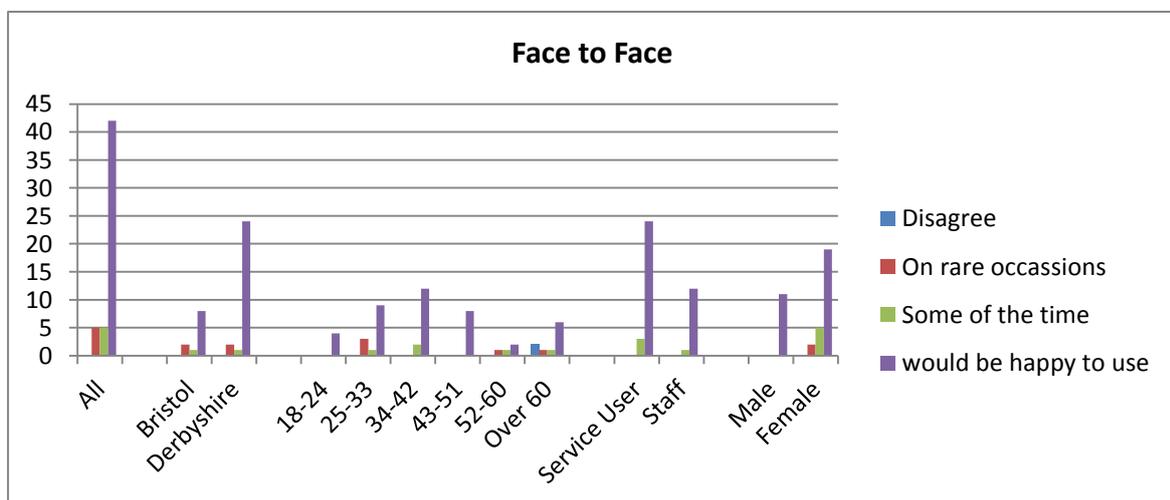
6.2.2 Telephone

The majority of people were either happy to use the telephone 54.4% (n=31) or use it some of the time 28.o% (n=16). There was no difference between the groups apart, with the majority either happy to use or would use the telephone some of the time.

Table 5: On a scale of 0 to 3, where "0" disagree and "3" would be happy to use, how would you feel about using the following in receiving/or giving care- Telephone

Answer	Count	Percentage
Disagree	1	1.8%
On rare occasions	3	5.3%
Some of the time	16	28.1%
Would be happy to use	31	54.4%
Not Stated	6	10.5%
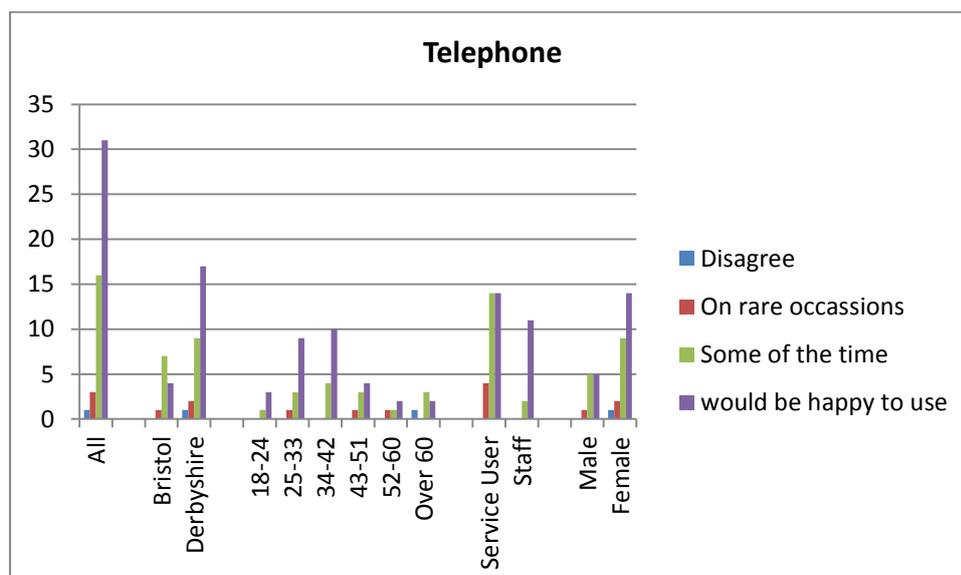
6.2.3 Internet

Respondents were split on whether they would use the Internet, 61% (n=35) were happy to use the internet with some preferring some of the time. There was a significant difference in the areas with Bristol showing a higher amount of people happy to use and would use the internet some of the time 83.3% (n=10) compared to Derbyshire 51.7%% (n=15). There were no significant differences amongst gender or staff/patients. With the younger age

groups they were more likely prepared to use the internet with the 18-24 age group

responding 100% (n=4) to happy to use and happy to use some of the time, with the over

60s at 50% (n=3) (Table 6).

Table 6: On a scale of 0 to 3, where "0" disagree and "3" would be happy to use, how would you feel about using the following in receiving/or giving care- Internet

Answer	Count	Percentage
Disagree	9	15.8%
On rare occasions	6	10.5%
Some of the time	20	35.1%
Would be happy to use	15	26.3%
Not Stated	7	12.2%
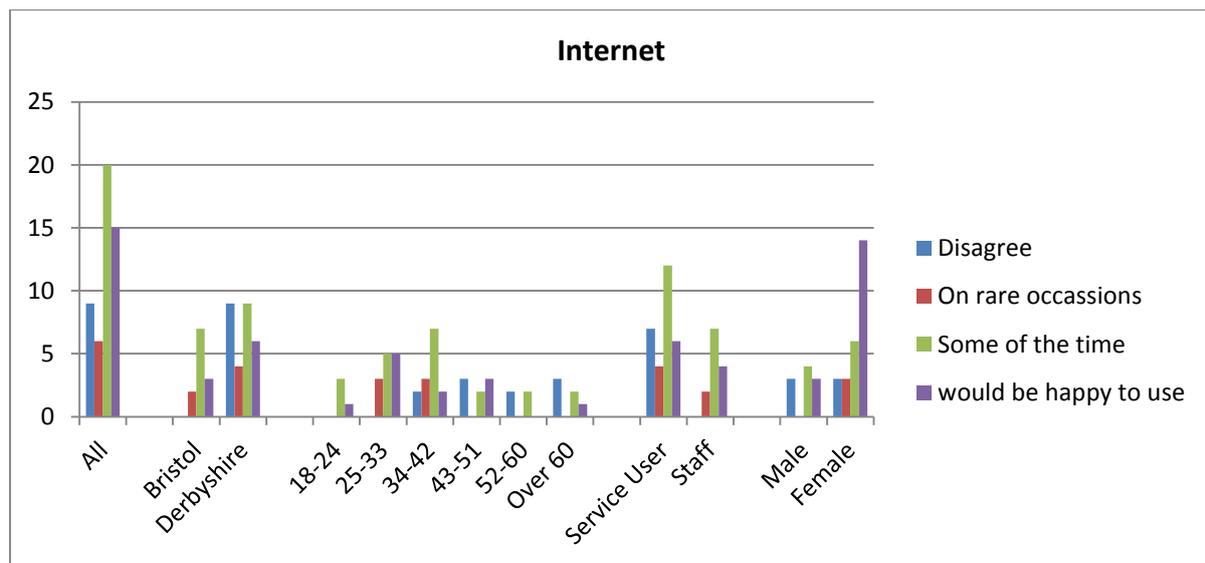
6.2.4 Video Conferencing

Over 49.1% of respondents disagreed or would only use video conferencing on the rare

occasion. This number was similar across all the various groups, apart from gender, where

females were more likely to use video conferencing 46.2% (n=12) versus men 18.1% (n=2) –

Table 7.

Table 7: On a scale of 0 to 3, where "0" disagree and "3" would be happy to use, how would you feel about using the following in receiving/or giving care- Video Conferencing

Answer	Count	Percentage
Disagree	9	15.8%
On rare occasions	6	10.5%
Some of the time	20	35.1%
Would be happy to use	15	26.3%
Not Stated	7	12.2%
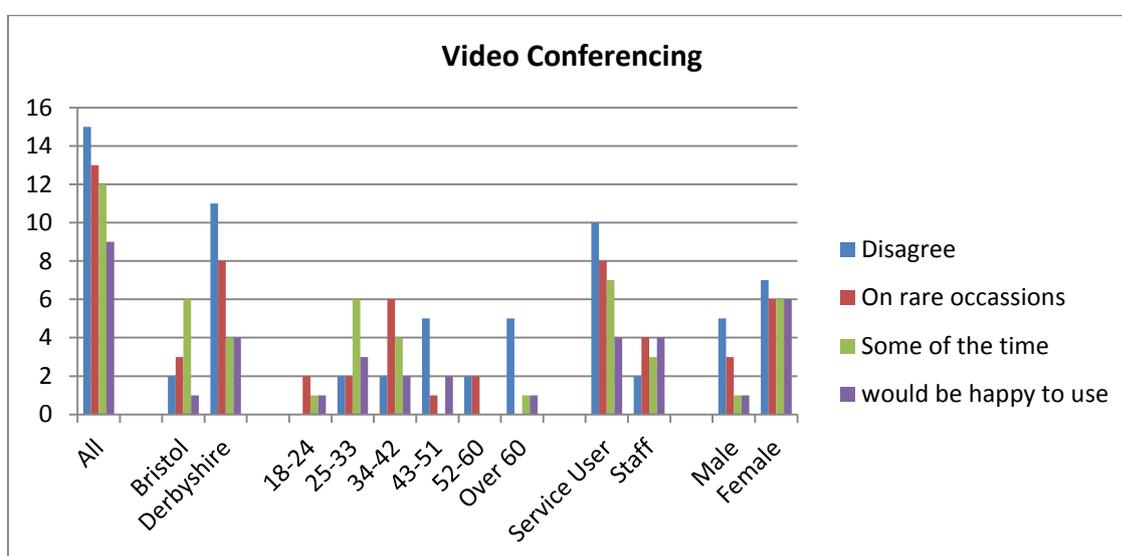
6.2.5 Mobile Phone Applications

52.6% of respondents disagreed or would use mobile phone applications on the rare occasion. This number was similar across genders, areas and staff/patients. There was variation in the age groups with only 25% (n=1) of 18-24 disagreeing or would use mobile phone on the rare occasion. The group with the highest dissatisfaction was the 43-51 years old with 87.5% (n=7) (Table 8).

Table 8: On a scale of 0 to 3, where "0" disagree and "3" would be happy to use, how would you feel about using the following in receiving/or giving care- Mobile Phone Applications

Answer	Count	Percentage
Disagree	17	29.8%
On rare occasions	13	22.8%
Some of the time	11	19.3%
Would be happy to use	8	14.0%
Not Stated	8	14.0%
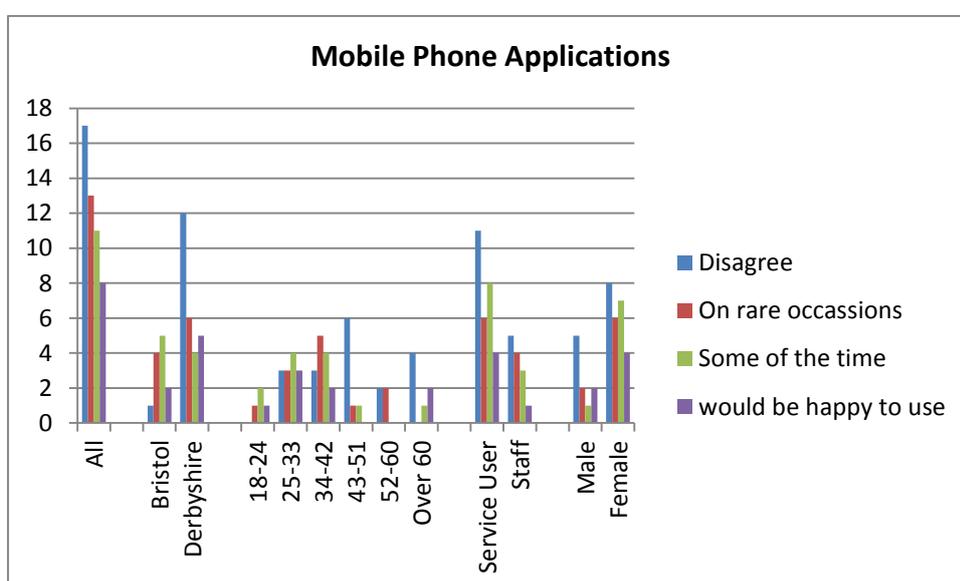
6.3 Intervention and disease areas that staff and patients would be happy to use telemedicine with.

Question 3 and 4 explored for which interventions and disease areas would respondents be prepared to use telemedicine solution. Question 3 asked "What telemedicine solutions do you think each of these service areas could use?" The interventions listed were assessment, education, therapy sessions, outpatient appointments, peer support and on-going support.

6.3.1 Telephone

The majority of respondents reported that they would use the telephone in all the interventions varying from 57.9-84.2%. There were no significant differences amongst the groups, with similar % (Table 9).

Table 9: What telemedicine Solutions do you think each of these service areas could use? - Telephone

Answer	Count	Percentage
Assessment	48	84.2%
Education	33	57.9%
Therapy Sessions	44	77.2%
Outpatients Appointments	39	68.4%
Peer Support	41	71.9%
On-going Support	42	73.6%
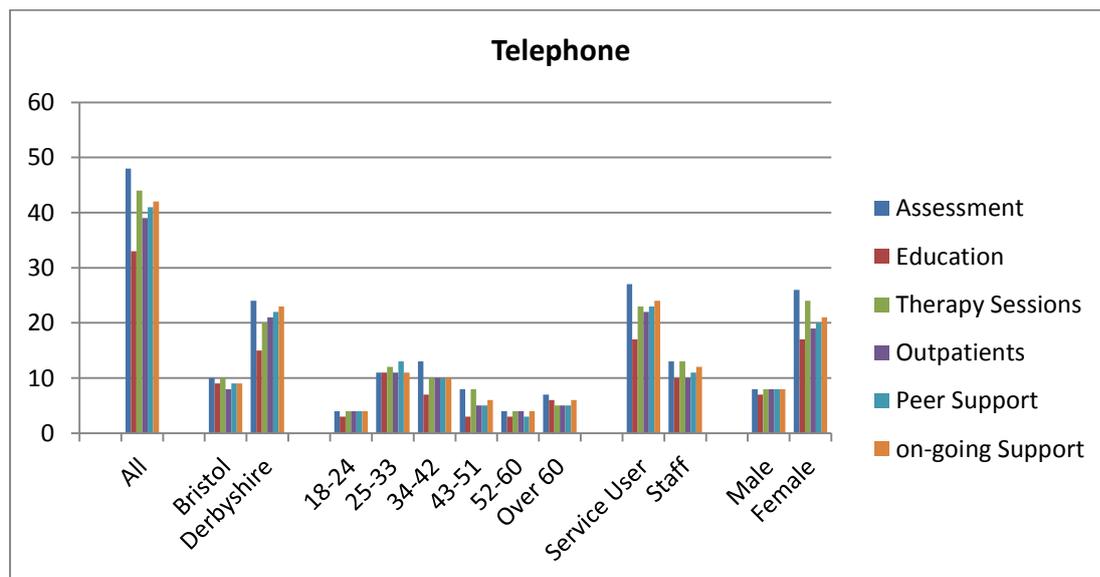
6.3.2 Internet

73.7% (n=42) respondents stated that they would use the internet for education purposes but the majority were not keen to use the internet for assessment (26.3%) or therapy sessions (31.6%). There were slight variations with the age groups. The groups under 42 years were more willing to use the internet generally with acceptance ranging from the

lowest 38.7% (n=12) for assessment to the highest 87.1% (n=27) for educational purposes. The older age group from 43 above lowest 15% (n=3) for assessment to the highest 70.0% (n=14) for assessments. There were no differences amongst staff or patients. Woman overall were more likely to use the internet in all aspects, for example 38.5% (n=10) would use the internet for assessment versus males where none of them would (table 10).

Table 10: What telemedicine Solutions do you think each of these service areas could use? - Internet

Answer	Count	Percentage
Assessment	15	26.3%
Education	42	73.7%
Therapy Sessions	18	31.6%
Outpatients Appointments	23	40.4%
Peer Support	31	55.4%
On-going Support	30	52.6%
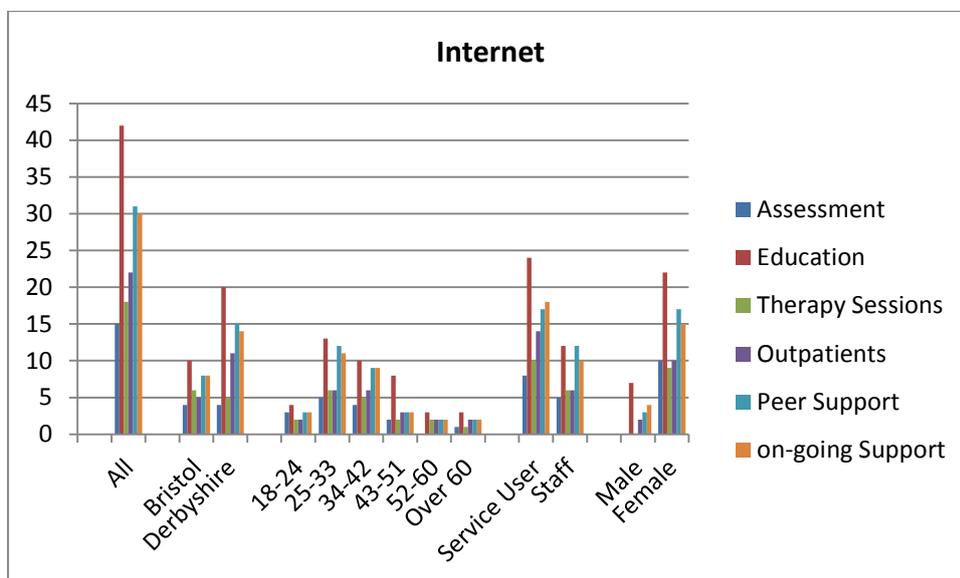
6.3.3 Video Conferencing

Less than half of respondents stated they would use video conferencing in all interventions, but the numbers for each intervention only varied slightly from 38.6% to 50.9%. There were

no significant variants between areas, staff/patients or gender. Within the age groups the younger groups were more likely to indicate they would use video conferencing in each of the interventions. For example 64.5% (n=20) 18-42 year olds indicated they would use video conferencing for therapy sessions compared to 30% (n=6) of 43 years and older age groups (table 11).

Table 11: What telemedicine Solutions do you think each of these service areas could use? – Video conferencing

Answer	Count	Percentage
Assessment	24	42.1%
Education	27	47.4%
Therapy Sessions	26	46.4%
Outpatients Appointments	22	38.6%
Peer Support	29	50.9%
On-going Support	24	42.1%
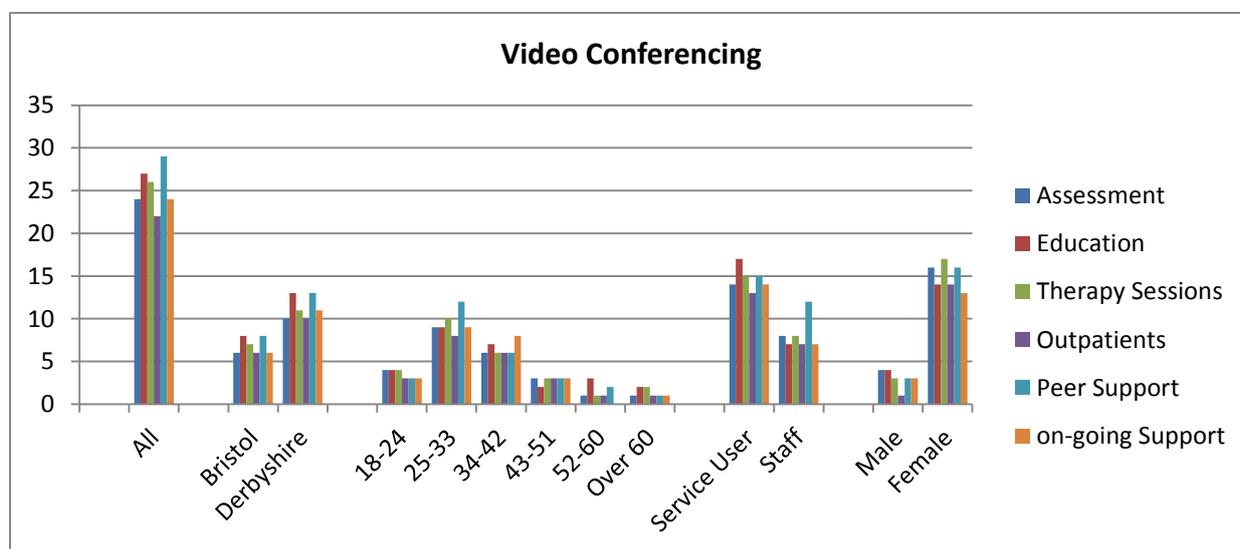
6.3.4 Mobile Phone Applications

Mobile phone applications were the least popular choice for respondents in using them in various interventions. Assessment and therapy sessions were the least liked, both at 14.0%. However respondents were more likely to state that mobile phone applications could be

used for educational purposes. The other differences were found amongst male and females. Women were more likely to state that they would use mobile phone applications, mainly in peer support (53.4%) and education (50%) compared to men who would not like to use mobile phones at all in peer support and only 18.1% would use in education (table 12).

Table 12: What telemedicine Solutions do you think each of these service areas could use? – Mobile phone applications

Answer	Count	Percentage
Assessment	8	14.0%
Education	27	47.4%
Therapy Sessions	8	14.0%
Outpatients Appointments	11	19.3%
Peer Support	21	36.8%
On-going Support	21	36.8%
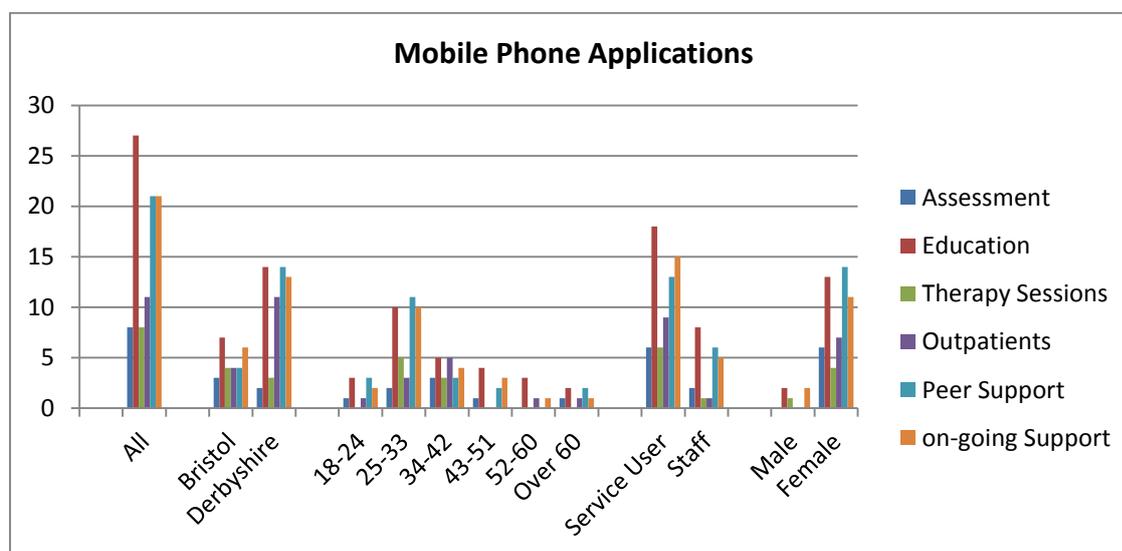
6.3.5 Would Telemedicine be a positive way to offer support and treatment

Question 4 explored if telemedicine would be a positive way to offer support and treatment in specific disease areas such as depression, long term conditions or bereavement. Respondents were given the opportunity to state any other areas, which none did. The majority of people thought it was a positive way to support depression/anxiety and long term

conditions. But 40.4% did not think telemedicine should be used to support people who were experiencing bereavement. There were no significant variations within any of the groups (Table 13).

Table 13: Do you think Telemedicine is a positive way to offer support and treatment for individuals with?

Answer	Count Yes	Percentage	Count No	Percentage
Depression and/or Anxiety	41	71.9%	7	12.3%
Long Term Condition	35	61.4%	13	22.8%
Bereavement	22	38.6%	23	40.4%
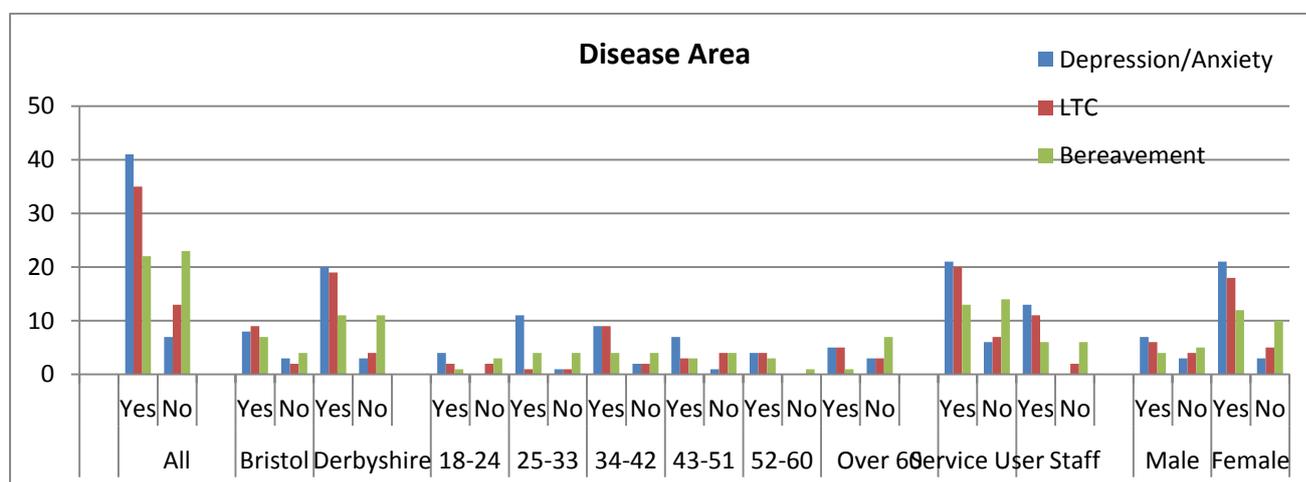
6.4 Comfort of use

The final question 5, explored what the potential barriers could be to using telemedicine, such as lack of technology, training and knowledge.

6.4.1 Telephone

The telephone received the least number to access and training. However 31.6% (n=18), said they would use it more if they had further information. Of those the majority who requested more information were staff (61.5%) and were male 63.6% (Table 14).

Table 14: What telemedicine Solutions do you think each of these service areas could use? – Telephone

Answer	Count	Percentage
I do not have access to	1	1.8%
I would need more training on	2	3.5%
I would use the following telemedicine if I had more information	18	31.6%
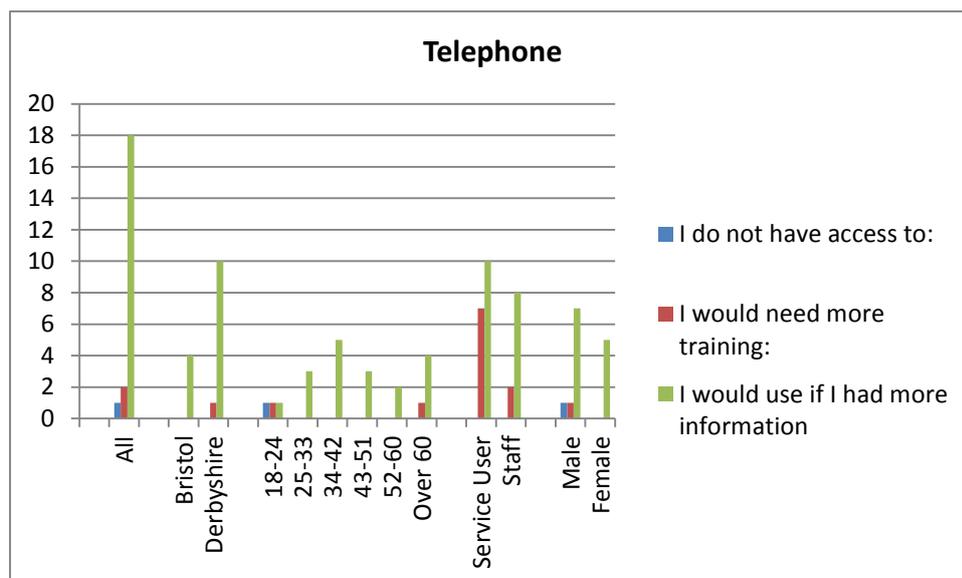
6.4.2 Internet

As with the telephone there were low numbers of respondents who said they did not have access to the internet and required further training. The respondents who did not have access and requested more training were all from Derbyshire and were more likely to be male. 45.5% (n=5) males did not have access to the internet compared to 15.4% of females (n=4) (Table 15).

Table 15: What telemedicine Solutions do you think each of these service areas could use? – Internet

Answer	Count	Percentage
I do not have access to	10	17.5%
I would need more training on	15	26.3%

I would use the following telemedicine if I had more information   16   28.0%
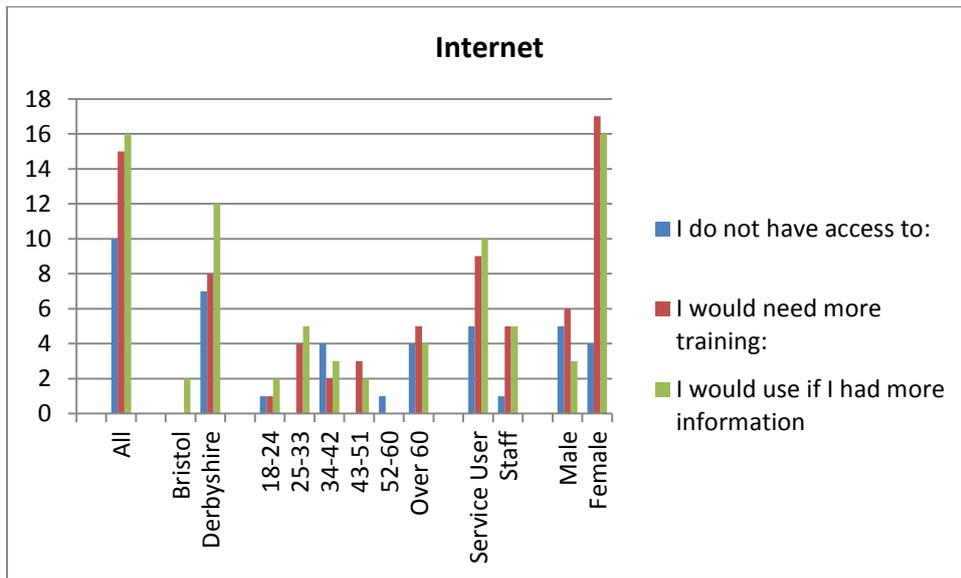
6.4.3 Video Conferencing

Over half of respondents, 54.4% (n=31) reported they did not have access to video conferencing. Bristol had the least amount of access with 75% of respondents reporting they did not have access to video conferencing. Although 41.3% in Derbyshire reported they did not have access, over 65.5% reported that they would still need further training in using video conferencing. There were no other significant differences amongst the other groups. There were no significant differences in stating if they would need more training or would use telemedicine if they had more information.

Table 16: What telemedicine Solutions do you think each of these service areas could use? – Video Conferencing

Answer	Count	Percentage
I do not have access to	31	54.4%
I would need more training on	36	63.2%
I would use the following telemedicine if I had more information	27	47.4%

Video Conferencing

Legend:
- I do not have access to:
- I would need more training:
- I would use if I had more information

Categories: All, Bristol, Derbyshire, 18-24, 25-33, 34-42, 43-51, 52-60, Over 60, Service User, Staff, Male, Female
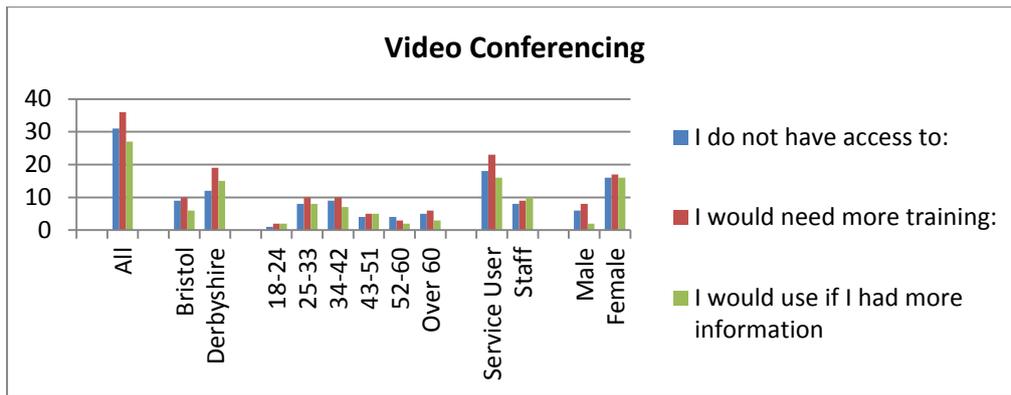
6.4.4 Mobile Phone Applications

There were differences in access to mobile applications in all the groups. In the areas Derbyshire reported the least access with 44.8% (n=12), compare to 25% in Bristol (n=9). In the age groups under 42 year olds 35.5% (n=11) reported not having access compared to 60% (n=12) in the 43 year olds and above. Patients reported that they were more likely to have less access to mobile phone applications with only 36.7% reporting they did not have access, compared to 61.5% amongst the staff group. Finally 81.8% of males did not have access compared to 30.8% of females. There were no significant differences in stating if they would need more training or would use telemedicine if they had more information.

Table 17: What telemedicine Solutions do you think each of these service areas could use? – Mobile Phone applications

Answer	Count	Percentage
I do not have access to	23	40.4%
I would need more training on	26	45.6%
I would use the following telemedicine if I had more information	23	40.4%

Mobile phone Applications

A bar chart titled "Mobile phone Applications" with a y-axis ranging from 0 to 30 (in increments of 5). The x-axis categories are: All, Bristol, Derbyshire, 18-24, 25-33, 34-42, 43-51, 52-60, Over 60, Service User, Staff, Male, Female. Three series are shown:
- I do not have access to: (blue)
- I would need more training: (red)
- I would use if I had more information (green)
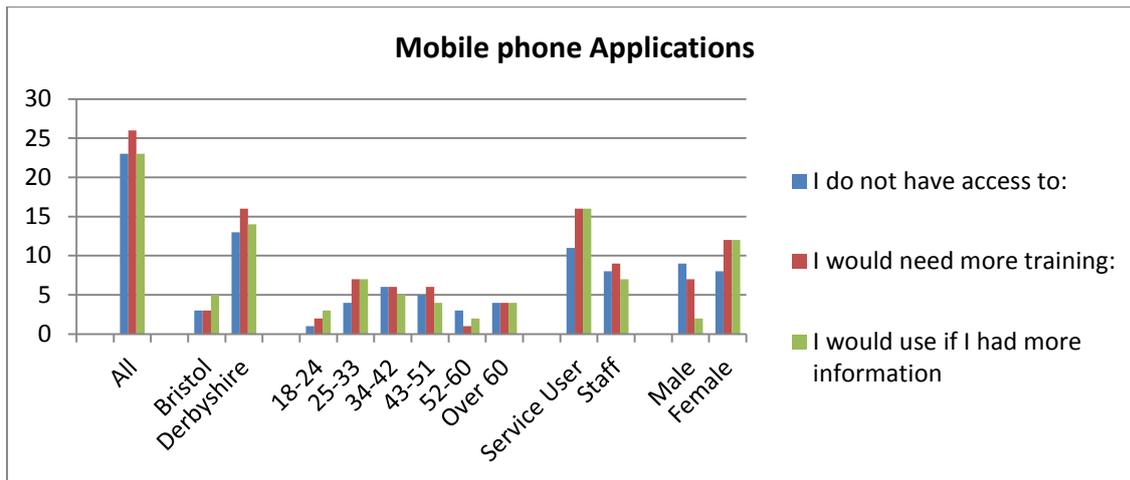
6.5 Any Other Comments

Finally respondents were given the opportunity to make any other comments. There were 3 responses which were as follows:

1) "*One of the key factors regarding anxiety/depression is the interaction with other people. Going down <u>this</u> road means less not more involvement; so I think it would be a retrograde step. The professionals need to <u>see</u> and assess people, this takes time and is not about ticking boxes*"
   Patient, over 60, Derbsyhire.

2) *When I am suffering with Depression and anxiety I find it very hard to use the telephone let alone the internet and mobile phone, this is something I show <u>no</u> interest in. However when I feel better in myself I would not have a problem using 'telemedicine'. I found the telephone conversation with 'Rightsteps' staff when I was at my worst and very low and with anxiety a lifeline! Just having someone at the other end of the phone who understands what you are going through is such a help.*"
   Patient, over 60, Derbyshire

3) "*Face to face is essential in building up self-esteem, relationships and confidence.*

   Telemedicine I feel can enhance as an additional means of support but not an

   exclusive means".

   Patient, 34-42 years, Derbyshire

Figure 4: Complete Data

Question 1

	Location		Age						Staff/Patient		Gender	
	Bristol	Derbyshire	18-24	25-33	34-42	43-51	52-60	Over 60	Patient	Staff	Male	Female
Telephone	12	28	3	13	13	8	4	8	29	13	9	26
Internet	12	21	3	12	10	8	2	4	24	11	6	23
Video Conferencing	0	3	0	1	1	1	0	1	4	0	0	2
Mobile Phone Applications	8	15	4	9	8	3	1	4	19	5	3	18

Question 2

	Location		Age						Staff/Patient		Gender	
	Bristol	Derbyshire	18-24	25-33	34-42	43-51	52-60	Over 60	Patient	Staff	Male	Female
Face to Face												
Disagree	0	0	0	0	0	0	0	0	0	0	0	0
On rare occasions	2	2	0	3	0	0	1	1	3	0	0	2
Some of the time	1	2	0	1	2	0	1	1	3	1	0	5
would be happy to use	9	25	4	9	12	8	2	6	24	12	11	19
Telephone												
Disagree	0	1	0	0	0	0	0	1	0	0	0	1
On rare occasions	1	2	0	1	0	1	1	0	4	0	1	2
Some of the time	7	9	1	3	4	3	1	3	14	2	5	9
would be happy to use	4	17	3	9	10	4	2	2	14	11	5	14
Internet												
Disagree	0	9	0	0	2	3	2	3	7	0	3	3
On rare occasions	2	4	0	3	3	0	0	0	4	2	0	3
Some of the time	7	9	3	5	7	2	2	2	12	7	4	6
would be happy to use	3	6	1	5	2	3	0	1	6	4	3	14
Video Conferencing												
Disagree	2	11	0	2	2	5	2	5	10	2	5	7
On rare occasions	3	8	2	2	6	1	2	0	8	4	3	6
Some of the time	6	4	1	6	4	0	0	1	7	3	1	6
would be happy to use	1	4	1	3	2	2	0	1	4	4	1	6
Mobile Phone Applications												
Disagree	1	12	0	3	3	6	2	4	11	5	5	8
On rare occasions	4	6	1	3	5	1	2	0	6	4	2	6
Some of the time	5	4	2	4	4	1	0	1	8	3	1	7
would be happy to use	2	5	1	3	2	0	0	2	4	1	2	4

Question 3

Telephone	Location		Age						Staff/Patient		Gender	
	Bristol	Derbyshire	18-24	25-33	34-42	43-51	52-60	Over 60	Patient	Staff	Male	Female
Assessment	10	24	4	11	13	8	4	7	27	13	8	26
Education	9	15	3	11	7	3	3	6	17	10	7	17
Therapy Sessions	10	20	4	12	10	8	4	5	23	13	8	24
Outpatients	8	21	4	11	10	5	4	5	22	10	8	19
Peer Support	9	22	4	13	10	5	3	5	23	11	8	20
on-going Support	9	23	4	11	10	6	4	6	24	12	8	21
Internet												
Assessment	4	4	3	5	4	2	0	1	8	5	0	10
Education	10	20	4	13	10	8	3	3	24	12	7	22
Therapy Sessions	6	5	2	6	5	2	2	1	10	6	0	9
Outpatients	5	11	2	6	6	3	2	2	14	6	2	10
Peer Support	8	15	3	12	9	3	2	2	17	12	3	17
on-going Support	8	14	3	11	9	3	2	2	18	10	4	15
Video Conferencing												
Assessment	6	10	4	9	6	3	1	1	14	8	4	16
Education	8	13	4	9	7	2	3	2	17	7	4	14
Therapy Sessions	7	11	4	10	6	3	1	2	15	8	3	17
Outpatients	6	10	3	8	6	3	1	1	13	7	1	14
Peer Support	8	13	3	12	6	3	2	1	15	12	3	16
on-going Support	6	11	3	9	8	3	0	1	14	7	3	13
Mobile Phone Applications												
Assessment	3	2	1	2	3	1	0	1	6	2	0	6
Education	7	14	3	10	5	4	3	2	18	8	2	13
Therapy Sessions	4	3	0	5	3	0	0	0	6	1	1	4
Outpatients	4	11	1	3	5	0	1	1	9	1	0	7
Peer Support	4	14	3	11	3	2	0	2	13	6	0	14
on-going Support	6	13	2	10	4	3	1	1	15	5	2	11

Question 4

	Location				Age												Staff/Patient				Gender			
	Bristol		Derbyshire		18-24		25-33		34-42		43-51		52-60		Over 60		Service User		Staff		Male		Female	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Depression/Anxiety	8	3	20	3	4	0	11	1	9	2	7	1	4	0	5	3	21	6	13	0	7	3	21	3
LTC	9	2	19	4	2	2	1	1	9	2	3	4	4	0	5	3	20	7	11	2	6	4	18	5
Bereavement	7	4	11	11	1	3	4	4	4	4	3	4	3	1	1	7	13	14	6	6	4	5	12	10

Question 5

	Location		Age						Staff/Patient		Gender	
Telephone	Bristol	Derbyshire	18-24	25-33	34-42	43-51	52-60	Over 60	Patient	Staff	Male	Female
I do not have access to:	0	0	1	0	0	0	0	0	0	0	1	0
I would need more training:	0	1	1	0	0	0	0	1	7	2	1	0
I would use if I had more information	4	10	1	3	5	3	2	4	10	8	7	5
Internet												
I do not have access to:	0	7	1	0	4	0	1	4	5	1	5	4
I would need more training:	0	8	1	4	2	3	0	5	9	5	6	17
I would use if I had more information	2	12	2	5	3	2	0	4	10	5	3	16
Video Conferencing												
I do not have access to:	9	12	1	8	9	4	4	5	18	8	6	16
I would need more training:	10	19	2	10	10	5	3	6	23	9	8	17
I would use if I had more information	6	15	2	8	7	5	2	3	16	10	2	16
Mobile phone Applications												
I do not have access to:	3	13	1	4	6	5	3	4	11	8	9	8
I would need more training:	3	16	2	7	6	6	1	4	16	9	7	12
I would use if I had more information	5	14	3	7	5	4	2	4	16	7	2	12

7. Discussion

Overall the research has demonstrated that staff and patients have a willingness to use telemedicine solution within talking therapies services, but there are some reservations within the various groups as to what type of interventions and what technology they would use. It was clear that both staff and patients however would need to have confidence in the solutions, by receiving more information on telemedicine and assistance with accessing solutions. Previous studies have identified these as barriers (Norman 2006) and state that these need to be addressed before any telemedicine solution is implemented (Shore et al 2007, Mair 2000). The feasibility of using telemedicine solutions is further supported in that 70-80% of people use the telephone and the internet on a weekly basis, apart from the over 60s and males. These two groups only had 50-54% of respondents reporting that they use the internet on a weekly basis.

Prior to this study Turning Point had previously implemented services that provided care via the telephone, but they were unsure how staff/patients felt about this type of care. As expected the majority in all of the groups were happy to have face to face care, this ranged between 67-100%. However the telephone showed that rural were more happy to use telephone, whereas the over 60s were not keen and there was no difference between male and female. The question however did not explore why there were such differences. For instance one study found that rural patients are more willing to accept telemedicine as it would eliminate long drives and give them better access (Grubaugh et al 2008). They also found that younger people were more receptive to telemedicine, a theme which flows throughout the results.

As found with previous studies (Norman 2006) there is evidence to suggest that certain interventions would be acceptable by certain populations. Within this study the majority of

groups felt that the telephone could be used in a variety of interventions whereas the internet, mobile phone applications and video conferencing was mainly acceptable when providing education, peer and on-going support.   In this section there was a division between age and gender. The younger people were more acceptant of using technology in a variety of situations and women were more acceptant than men, who were not keen on anything apart from the telephone.

Mobile phone applications and video conferencing seem to be overall the least accepted telemedicine solution. This could be due to several reasons which include lack of access and lack of knowledge. However further research would be need to understand the reasons behind this as the majority of studies for video conferencing have found overall the general consensus is that patients and clinicians are satisfied with using video conferencing and have felt that video conferencing is as good as face to face (Wootton el al 2003: Monnier et al 2003).

7.1 Rural/ Urban

The areas chosen within the research represented both urban, Bristol and rural, Derbyshire areas. Bristol has a population density of 4,026(per km2) compared to the Amber Valley region in Derbyshire of 458 (per km2) (HM Government 2012).

It was expected due to isolation people in rural areas would have more access to technology. A recent report by Ofcom (2010) reported that 72% of rural areas had internet connections vs. 69% in urban areas. Within the research no respondents reported that they did not have access to the Internet in Bristol compared to 26% in Derbyshire. Interestingly Derbyshire reported that they were more likely to use video conferencing 9% compared to 0% in Bristol.

There is an abundance of research looking at rural and remote populations and usage of telemedicine solutions. There is much research that supports the use of telemedicine solutions to address isolation of communities, where they have limited access to services. However the survey carried out showed no difference in the acceptability of using telemedicine solutions. Therefore it cannot be assumed that because rural areas are well suited for telemedicine solutions, that patients and staff are willing to use it.

7.2 Age

Throughout the survey it is apparent that the over 60 group were less reluctant to use telemedicine solutions with one respondent reporting *"one of the key factors regarding anxiety/depression is the interaction with other people, going down this road means less not more involvement….."*

Richardson et al (2009) believe that many older people may have less experience in using technology and therefore have a more limited knowledge of how it can be used in health care. The survey shows that the over 60s are less likely to use technology, with 50% of respondents over 60 having used most of the technologies, apart from video conferencing, compared to 75-100% in the 18-24 age groups. This is slightly more than a study carried out in Wales that found 22.4% of people over 60 had used a computer in the previous 12 months (Selwyn et al 2003).

However it has been questioned whether technology would have its advantages for older population, as it lack of access to services due to mobility and transportation (Richardson et al 2009). Despite the survey results and reports from other studies that have found that older people are more reluctant to use technology it is believed that with experience and guidance older people are likely to improve their usage experience (Czaja 2003, Calvert et al 2009).

7.3 Staff and Patients

For more than 10 years now surveys have reported that staff and patients are cynical about the use of technology, believing that it can affect the client- therapist relationship (Baer et al 1997). The results of the survey show that over half of the member of staff and patients would be satisfied in using telemedicine solutions, with their only reluctance using mobile phone applications.

The survey shows there is a willingness to use technology in care by both staff and patients. However before implementation it will be necessary to ensure that they have the right information, easy access and reliable technology. Within the survey it is apparent that both staff and patients are lacking this, so it would be vital that any organisation provide the necessary information and education before implementing any technology solution. The evidence suggests that if patients and staff are consulted and have confidence in the technology it is more likely to succeed (Norman 2006).

7.4 Gender

There are limited studies that examine if there are differences between telemedicine acceptance and gender. Two large studies of 194 and 116 participants found no difference in attitudes and willingness to use telemedicine solutions (Grubaugh et al 2008, Eikelboom et al 2005). This is mirrored in the survey apart from the willingness to use the Internet.

Women reported that they would likely use the internet if they had more information 67% vs. 27% of men. Historically men were the higher user of the internet with one survey reporting 95% of users of the world wide web were men (Pitkow 1994), but in a more recent survey

showed little difference with men (78%) slightly more than women (75%) (Tobin 2008). With regards to mental health, a survey of 914 people, found that there was no statistical gender difference in internet usage for mental health problems.

8. Conclusion

8.1 Summary of Research

Overall past studies and the study described in this thesis, shows that there is a willingness by staff and patients to utilise telemedicine solutions. The use of telemedicine solutions is there to enhance and support current care. It allows patients and staff more choice and access to solutions. Therefore service providers such as Turning Point have the opportunity to embrace these technologies that add value to peoples care.

This chapter discussed the results from a survey given to staff and patients. The study, demonstrated similar results to previous work, which found that if patients and staff are provided with the right information and trained, then they will be prepared and will use telemedicine solutions. However further work needs to be done to understand in more depth patients and staff perceptions and concerns.

Telemedicine has been suggested as a means of tackling future challenges in health care, especially in regards to saving money. The literature review and results both highlight the need for organisations considering telemedicine solutions to consider cost, lack of information, lack of training and access, as these are all potential barriers to successful implementation. If these are addressed then the evidence suggests that telemedicine solution will save money, improved choice and access for patients.

8.2 Limitations of the Study

There were numerous limitations of the study:

1) Although the service managers of both the sites were debriefed and on-board with the questionnaire, there was a poor response rate. Due to the locations the researcher was unable to attend the sites to help with recruitment. There appeared to be significant variation in responses across the 2 sites but 16 people (28%) had not stated their area.

2) The scope of the survey was very broad and the questionnaire could have sometimes limited people's response. For example the questionnaire could have explored in more detailed why people did not have access to certain technologies – was it due to cost or they generally had no interest. It would have been beneficial to understand why someone may not want to use a particular solution such as mobile applications, was this because they did not understand what it's uses could be?

3) Although there were 57 respondents, when broken down in age, gender area, it generated very small sample sizes. Larger studies should be developed looking at each of the categories in more depth.

4) One area the study did not address was whether ethnicity would play a part. There have only been a handful of studies (Yellowless etc al 2008) so this would have been an opportunity to explore, especially as Bristol has a high ethnic population of 13.5% (Bristol City Council 2011) which is higher than the UK average of around 10% (Rogers 2011).

8.3 Recommendations

Implementing Telemedicine solutions is not a simple solution, as outlined in the research there are several variables that can affect the successful implementation. As telemedicine is going to change IAPT services from a predominately face to face service, to a service that

also utilises various technologies in providing care, those within the services will need to embrace telemedicine and make it an important part of their service delivery. It is hoped that the recommendations in this research will assist in make this happen. Based on the literature and study, the researcher would like to make the following recommendations:

1) Further qualitative study to get a better understanding of staff and patients perceptions and concerns. For instance understanding why in some areas they would not be happy to use a solution -Is this due to their lack of knowledge of what is available or is this informed response?

2) Understanding the target population: The study has demonstrated that various demographics such as rural/urban and age can make a difference in willingness to use telemedicine solutions. Further work would need to be done to understand these differences and whether education would address any barriers.

3) There have been several successful and sometimes failed telemedicine sites. Organisations should find ones that appear to fit their sites and send staff to meet in order to develop a better understanding of what worked and didn't work in real life.

4) Before implementing a telemedicine solution organisations should perform a cost benefit analysis which should include equipment, training, implementation, operational and on-going support costs vs. cost savings such as travel, staff time and administration savings, such as hand-outs.

8.4 Future work

Telemedicine has the potential to meet the unmet need within mental health organisations but further work would need to be done to fully understand patient and staff perceptions about using telemedicine. It would be beneficial to compare pre and post telemedicine implementation. The aim would be to understand what are the barriers such as lack of knowledge prior to using a telemedicine solution and are these barriers broken down after usage.

APPENDICES

Appendix 1– Information Sheet

What is this questionnaire about?

This survey is to find out what staff and service users, within Turning Point Services, view's on using telemedicine in their care. The world has entered an 'information age'. Computer and technology is having a profound effect on the way health and social care is been delivered. One area that is rapidly growing is the area of telemedicine.

Telemedicine, taken literally, is 'medicine at a distance' ('tele' being the Greek stem for distance). So, theoretically, anything to do with medicine that does not take place 'face to face' and 'in person' can be considered 'telemedicine' such as telephones, video conferencing and the internet to provide a range of service for service users including assessment/screening, support, treatment and education.

The research has several objectives including:
- to understand peoples thoughts on telemedicine
- To look at what are the benefits and potential barriers around telemedicine

This is not a test, so don't feel that you have to go away and read about the subject before filling in the questionnaire! It is your present state of knowledge and understanding of telemedicine that I am really interested in.

Why should I complete the survey?

Understanding your views is vital to help us improve our services and incorporate any new technologies which may benefit service users. We are currently asking service users that have been or are receiving treatment with our Improving access to psychological therapies (IAPT) as there is increasing research that shows that this type of service might benefit from telemedicine. We have chosen you at random.

Participation is voluntary; Right to Withdraw without Negative Consequences

You are under no obligation to participate in this research project; there are no negative consequences to deciding not to participate. If you do agree to participate, you are not obliged to answer specific questions or to provide information you do not wish to give. You have the right to not answer specific questions but continue as a participant.

In addition, you can withdraw from the project up until the point when the researcher provides the summary report of the questionnaires. There will be no negative consequences to withdrawing from the research project. You can state your intention to withdraw from the project by contacting me, the researcher, Aislinn Enright (contact information is provided below). If you choose to withdraw from the project please indicate whether you want the previously collected data destroyed or returned to you.

How to complete the questionnaire: It will take about 5 minutes to complete. You can either do this on line at **http://www.surveymonkey.com/s/9N6YB5N** or fill in the attached paper copy, which you can return to the service.

There is an opportunity to give us more information should you wish in the space provided.

Confidentiality and Anonymity
Your participation in this research will be kept in confidence. Pseudonyms will be used for all participants. Confidentiality of your data is assured. No identifying information will be included in any document resulting from this study.

Contact information
Aislinn Enright - Aislinn.enright@turning-point.co.uk

Title

 A dissertation to the University of Dublin, in partial fulfilment of the requirements for the degree of Master of Science in Health Informatics

Background

The author of this proposed research project works for a large social enterprise that provides services for people with complex needs, including mental health. An important aim for the organisations, as with most, is to develop services that drive costs down but maintains the high quality of care. This drive has come about due to the department of health in the UK who have developed a "payment by results (PbR)" model (DH 2011).

In response the organisation are turning to the use of technology and one suggestion is the use of telemedicine, specifically video conferencing and e-therapy for carrying out mental health assessments and on-going treatment in their services for Improving access to Psychological Therapies (IAPT). Previous research has shown that the use of video conferencing (Richardson et al 2009) and e-therapy (Proudfoot 2004) can improve outcomes and are likely to be cost effective. However the organisation wants to find out what the enablers or barriers to implementation.

Therefore it is proposed to undertake an exploratory research study to establish what the enablers and barriers are to the implementation of telemedicine within a mental health service, focusing on video conferencing and e-therapy.

Telemedicine

Telemedicine is the use of technology such as telephones, video conferencing and the internet to provide a range of service for patients including screening, support, treatment and education.

Video Conferencing

Video conferencing is been increasingly used in health care for a variety of reason such as direct patient care, peer support and peer education. It has seen a rapid growth due to such things as faster bandwidth, better cameras and monitors (Crump 1998).

Video conferencing provides a link that allows audio and visual communication between a patient and clinician, from 2 different locations. This takes place in "real time", therefore allowing both parties to act upon information as they receive it (Norris 2001).

E-Therapy

E-therapy refers to mental health services that are provided via the internet. This can consist of email support, chat rooms, learning and support tools. They can also incorporate video conferencing facilities. They vary in their offerings; some are standalone treatment packages whilst others use the support and guidance of clinicians (Proudfoot 2004).

IAPT services

Improving access to psychological therapies is an initiative developed by the department of health in the UK (DH 2005), for people with common mental illness such as depression and anxiety. The aim is for patients to receive fast access to a choice of psychological therapies in addition to "care as Usual". The service is provided in a step care approach as recommended by the NICE guidelines for depression and anxiety (DH 2004, amended 2007). The steps and interventions can vary, but the overarching principle is that a patient gets the least burdensome, effective treatment. Anyone entering the service will receive care from either a low or high intensity workers depending on their need.

Low Intensity worker
  4) Provide up to 5 sessions of low intensity Cognitive Behavioural Therapy (CBT).
  5) The worker is a graduate psychologist who receives training and support.
  6) Interventions are provided face to face or over the telephone

High Intensity Worker
  4) Are trained therapist in CBT
  5) Provide 12-20 sessions
  6) Sessions are face to face

(IAPT 2011)

Payment by Results

The government in England have developed a payment by results model, which they hope will encourage service providers to increase their activity. It will allow commissioners to fund services that are lower in cost, so they can reinvest the surplus (Fairbarin 2007)

Therefore mental health services will:
  4) be paid directly for the work they undertake
  5) Need to be able to measure what they do, which in turn will improve and inform patient care
  6) Use new and innovative ways of working to ensure the best care at the best price for patients

(Sainsbury Centre for Mental Health 2004)

Research Aims

The primary aim of the research will be to help identify what are the enablers and barriers to implementing telemedicine systems in a mental health service, in order for an organisation to decide whether to consider the implementation of a system. The study will aim to identify:

  1) What are the potential benefits of a video conferencing system and/or e-therapy?
  2) What are Staff and patient views of video conferencing system and/or e-therapy?
  3) What are the main enablers and barriers for staff and patients using telemedicine solutions?
  4) How can access and usability issues be practically resolved?

Literature Review

A review of the literature will take place using the following:

Online databases – PubMed, MEDLINE, Google Scholar, Trinity College Library

Government and other Regulatory Bodies – Department of Health, National Institute of clinical Evidence, Connecting for Health.
Journals – focusing on: health informatics, psychology, nursing, medical, mental health.

The following terms will be considered when carrying out a search:
Telepsychiatry
videoconferencing
Telepsychology
E-therapy
Telemedicine

Research Design and Methodology

Research Design

Following a comprehensive literature review the next step is to design the research project. The research will be using a mixture of qualitative (semi-structured interviews) and quantitative (questionnaire). Both types are research models are widely used within health care to help understand and explain complex, real world situations (Bradley et al 2007).

In the first phase an in depth semi-structure interview will be designed and conducted to capture data from a sample clinical staff, patients and IT staff. The interview will consist of clear, non-technical terms words and cover areas such as:

7) What are their views on the value and merit of telemedicine?
8) What are the strengths and weaknesses?
9) How well do they feel telemedicine will allow for effective interaction with patient/clinician?
10) What differences do you envisage between face to face and video conferencing and/or e-therapy?
11) How easy would it be for you to access and use a video conferencing system and/or the internet?

The aim would be for the interviews to last half an hour, and to allow for accurate transcription it will be voice recorded.

Following analysis of the interviews, it is hoped that a questionnaire can be developed using key themes developed from the interviews. This will be issued to a wider group of staff and patients. The aim of the questionnaire will be to gather data with more specific questions that could then be replicated in other services of the organisation, such as the drug and alcohol services.

Data Collection

Three sites have been identified. More data needs to be collected on the amount of patients seen per year. Once all the data is complete a decision will be made on the numbers to be interview and numbers to receive questionnaire- step 2 and 3 staff, as well as patients will be included. As there is limited IT staff only the IT manager will be interviewed.

Site	Step 2 Staff	Step 3 Staff	Patients per Year
Bristol	16	22	TBC
Wakefield	17.5	24	TBC

East Sussex	28	TBC	TBC

Questions may vary according to whether the person is clinician, patient or IT staff. When recruiting participants for the study some areas may need to be considered such as age and IT experience.

Analysis of Data

The interview results will be triangulated with the questionnaire data. Triangulation allows for multiple research approaches to be used, which means that the questionnaire (quantitative) can be backed up by the more in depth semi-structure interview (qualitative) (Wisker 2007) or vice versa.

It is unlikely that there will be too much data that might require elaborate statistical analysis and a statistical analysis system.

In the first phase Data collected from the interviews will be analysed on an on-going basis and not left until the end of data collection, to start the development of the questionnaire.

To analyse the interviews, the research will have to identify relationships between the data and develop categories to reach a conclusion (Silverman 2009). This may be done with the assistance of a qualitative data analysis software package, which can assist with coding relationships and categories.

A detailed approach to analysis will be developed following the qualitative interviews stage of the study. However it is envisaged after the collection of the questionnaires that a standard statistical packages may be used to help examine any cross-tabulation, or relationships, or categories which emerges

Timescale

The table below outlines the key stages of the study. The study is been conducted on a part time basis over one year.

Ethics Approval

Approval will be sought from the researcher's organisation and in addition the Researchers University.

Limitations

The study is been carried out over one year part time. Therefore it is vital that the timelines are kept as there is no room for slippage, such as a delay in ethics approval.

Appendix 3 - Consent Form

Consent for questionnaire

I agree to participate in this research project, understanding that I am doing so voluntarily, that confidentiality will be maintained, and that I have the right to withdraw from the study at any point using the means outlined in the Invitation to Participate.

DECLARATION:
- *I am 18 years or older and am competent to provide consent.*
- *I have read, or had read to me, a document providing information about this research and this consent form. I have had the opportunity to ask questions and all my questions have been answered to my satisfaction and understand the description of the research that is being provided to me.*
- *I agree that my data is used for scientific purposes and I have no objection that my data is published in scientific publications in a way that does not reveal my identity.*
- *I understand that if I make illicit activities known, these will be reported to appropriate authorities.*
- *I freely and voluntarily agree to be part of this research study, though without prejudice to my legal and ethical rights.*
- *I understand* that I may refuse to answer any question and that I may withdraw at any time without penalty.
- I understand that my participation is fully anonymous and that no personal details about me will be recorded.
- *If the research involves viewing materials via a computer monitor* I understand that if I or anyone in my family has a history of epilepsy then I am proceeding at my own risk.

I am happy to participate in the research (please check here) _____.

Appendix 4 - Questionnaire

Questionnaire

1) Do you use the following at least once a week or more?

Telephone	Yes	no
Video conferencing such as Skype	Yes	no
Internet	Yes	no
Mobile phone Applications	Yes	no

2) On a scale of 0 to 3 where '0' disagree and '3' who be happy to use, how would you feel about using the following in receiving/or giving care:

Face to face meeting	Disagree	0	On rare occasions	1	Some of the time	2	Would be happy to use	3
Telephone	Disagree	0	On rare occasions	1	Some of the time	2	Would be happy to use	3
Video conferencing such as Skype	Disagree	0	On rare occasions	1	Some of the time	2	Would be happy to use	3
Internet	Disagree	0	On rare occasions	1	Some of the time	2	Would be happy to use	3
Mobile phone Applications	Disagree	0	On rare occasions	1	Some of the time	2	Would be happy to use	3

3) What telemedicine solutions do you think each of these service areas could use?

Assessment	Telephone	Video Conferencing	Internet	Mobile phone applications
Education	Telephone	Video Conferencing	Internet	Mobile phone applications
Therapy sessions	Telephone	Video Conferencing	Internet	Mobile phone applications
Outpatient appointments	Telephone	Video Conferencing	Internet	Mobile phone applications
Peer support	Telephone	Video Conferencing	Internet	Mobile phone applications
On-going Support	Telephone	Video Conferencing	Internet	Mobile phone applications

4) Do you think Telemedicine is a positive way to offer support and treatment for individuals with?

Depression and/or Anxiety	Yes	No
Long Term Condition	Yes	No
Bereavement	Yes	No
Other:	Yes	No

If other please state	Yes	No

5) The following statements refer to the possible impact of Telemedicine. What do you think? (you can select more than one answers)

I do not have access to	Telephone	Video conferencing	Internet	Mobile phone applications
I would need more training on	Telephone	Video conferencing	Internet	Mobile phone applications
I would use the following telemedicine solutions if I had more information	Telephone	Video conferencing	Internet	Mobile phone applications

6) Any other comments:

7) Please tick which applies to you: I am a

Service User	
Member of Staff	
Male	
Female	

8) Please tick which age group you fit into?

16-24	
25-33	
34-42	
43-51	
52-60	
Over 60	

9) Please state the town you are receiving/providing care:

Thank you for taking the time to complete this survey.

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