

## Usefulness of telepsychiatry: A critical evaluation of videoconferencing-based approaches

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### Abstract

Telepsychiatry, *i.e.*, the use of information and communication technologies to provide psychiatric services from a distance, has been around for more than half a century now. Research over this period has shown that videoconferencing-based telepsychiatry is an enabling and empowering form of service delivery, which promotes equality of access, and high levels

of satisfaction among patients. The range of services offered by videoconferencing-based telepsychiatry, potential users and points of delivery of such services are theoretically limitless. Telepsychiatry has both clinical utility and non-clinical uses such as administrative, learning and research applications. A large body of accumulated evidence indicates that videoconferencing-based telepsychiatric assessments are reliable, and clinical outcomes of telepsychiatric interventions are comparable to conventional treatment among diverse patient populations, ages and diagnostic groups, and on a wide range of measures. However, on many aspects of effectiveness, the evidence base is still relatively limited and often compromised by methodological problems. The lack of cost-effectiveness data in particular, is a major hindrance, raising doubts about the continued viability of telepsychiatric services. Added to this are the vagaries of technology, negative views among clinicians, poor uptake by providers, and several legal, ethical and administrative barriers. These hamper the widespread implementation of telepsychiatry and its integration with routine care. Though further advances in technology and research are expected to solve many of these problems, the way forward would be to promote telepsychiatry as an adjunct to conventional care, and to develop hybrid models, which incorporate both traditional and telepsychiatric forms of mental health-care.

**Key words:** Videoconferencing; Telepsychiatry; Tele-mental-health; Assessment; Management; Reliability; Efficacy; Effectiveness; Outcome

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**Core tip:** Telepsychiatry refers to the use of information and communication technologies to provide psychiatric services from a distance. Evidence accumulated over six decades shows that videoconferencing-based telepsychiatry is an acceptable and feasible form of providing mental health-care. Additionally, videoconferencing-based assessments are reliable, and clinical outcomes

of telepsychiatric interventions are comparable to conventional treatment among diverse patient populations on several measures of outcome. However, problematic study-designs, uncertainty about cost-effectiveness, and poor uptake have hindered the progress of telepsychiatric services. Conducting further research to address these problems, and developing hybrid models incorporating traditional and telepsychiatric forms of care, would be the way forward.

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## INTRODUCTION

Mental health surveys indicate that about a-fifth of the world population suffers from mental disorders, which require treatment<sup>[1]</sup>. Mental illnesses are not only a source of disability and great distress for those afflicted, but also impose a heavy burden on families of the mentally ill and the society. Despite their high prevalence and potentially disabling consequences, inadequate treatment of mental disorders is rife. Unavailability of accessible and affordable mental health-care is a major hindrance to obtaining treatment<sup>[1]</sup>. Moreover, treatment resources are not distributed uniformly; consequently, rural and geographically isolated areas remain largely underserved. Traditional systems of mental health-care delivery are not always able to meet the demands of people in these remote areas. Therefore, alternatives to the traditional modes of service delivery for mental health-care have been explored from time to time. One such alternative has been the use of information and communication technologies (ICTs) for delivering mental health care. Advancements in ICTs have been successfully utilized in the field of health-care over the last few decades. The most promising of these is the use of ICTs to deliver mental health-care from a distance, referred to as telepsychiatry. Telepsychiatry was originally conceived to enhance access of remote and rural populations to specialized mental health services. Over the last six decades or so, a growing body of evidence and increasing implementation has demonstrated telepsychiatry's ability to provide mental health services, which are accessible, wide-ranging and of high quality. However, concerns about the applicability and usefulness of this mode of service-delivery still remain. Despite being somewhat of a success story in developed countries, telepsychiatry is yet to make its mark in low- and middle- income countries of the developing world<sup>[2]</sup>. This is unfortunate because the need for such services is probably greater in these countries. This review seeks to evaluate the usefulness of telepsychiatry as a mode of service-

delivery based on the current evidence. In addition to the evidence for telepsychiatry's efficacy or effectiveness, the evolution of telepsychiatry, the terms used to describe this technology, the limitations of this form of service-delivery and its potential role in low- and middle-income countries have also been elaborated upon. The focus of this review is restricted to the utility of videoconferencing-based approaches in delivering mental health-care. Although other modes such as telephones or internet-based care, which form a part of the broader array of telemental health or e-health services, have been mentioned, these modalities have not been reviewed in detail. Finally, while considering the evidence, greater emphasis has been placed on randomized-controlled trials (RCTs), these being highest level of research-evidence on the usefulness of any treatment-modality.

## SEARCH STRATEGY

To review the evidence on telepsychiatry and videoconferencing, a comprehensive search of the following databases was undertaken: MEDLINE, PubMed, PsycINFO, EMBASE, Cochrane Database of Systematic Reviews, Cochrane Controlled Trial Registry, Database of Abstracts of Reviews of Effectiveness, and Google. Search terms included telepsychiatry, telemental health, telecare, telemedicine, e-health, videoconferencing, effectiveness, efficacy, access, outcomes, satisfaction, quality of care, and controlled trials. Articles extracted were of three main types: Reviews, guidelines and original research articles. All articles about videoconferencing were manually searched to locate cross-references relevant to the topic. Articles about other modes of telemental health were examined when they provided information relevant to the subject under review.

## THE EVOLUTION OF TELEPSYCHIATRY

Telepsychiatry is one of the oldest applications of telemedicine. The earliest documentation of telemedicine in psychiatry was from the University of Nebraska, where in 1956 a two-way closed-circuit television system was used for educational and medical purposes<sup>[3]</sup>. In 1961, videoconferencing was used to conduct adult group psychotherapy<sup>[4]</sup>. In 1973, the term telepsychiatry was first used by Dwyer<sup>[5]</sup> to describe consultation services provided from the Massachusetts General Hospital to a medical site in Boston. Shortly thereafter, telepsychiatry was used among children and adolescents, when a child guidance clinic in New York City was connected to the Mount Sinai School of Medicine<sup>[6]</sup>. Despite this initial success and subsequent reports of its usefulness and acceptance, telepsychiatry was used only sporadically in the 1960s and 1970s. Advances in technology in the late 1980s and early 1990s, which reduced equipment costs, coupled with increased funding from government agencies led to a

burgeoning of programmes in north-America, Europe and Australia<sup>[7-14]</sup>. Currently telepsychiatry is one of the most rapidly developing fields of telemedicine, and, after teleradiology, the most practiced form of telemedicine in the world<sup>[15]</sup>. Additionally, from the late 1990s there has been a proliferation of research interest in telepsychiatry, which is reflected in the growing number of reports and reviews of the subject in the past decade and a half. Initial research was focused on descriptions of programmes, and feasibility and acceptability of telepsychiatry<sup>[7-14]</sup>. This has been supplemented over the last decade by controlled trials on outcome, research on other issues such as cost-effectiveness, ethical and legal implications, and by several guidelines on telepsychiatry<sup>[7-14]</sup>. The emphasis of research on telepsychiatry has also undergone a subtle change of focus; earlier attempts to prove its usefulness are now being replaced by attempts to identify specific situations in which telepsychiatry might be useful, and by evaluation of the strengths and weaknesses of this method of service-provision<sup>[13,14]</sup>.

## TERMS AND CONCEPTS USED

Although there are no universally agreed definitions of terms used to describe telepsychiatry, several partially overlapping labels and concepts have been used to refer to the entire spectrum of services, which are delivered remotely, that is from a distance and a separate location<sup>[7,8]</sup>. This lack of consistency in definitions may create difficulties in evaluation of the utility of telepsychiatry<sup>[16,17]</sup>. Hence, an attempt has been made here to provide clearer definitions of four commonly used terms including telepsychiatry, telemental health care, telemental health, and e-mental health. Three of these terms use the prefix "tele", which means at or over a distance, as in telegram, telephone, or television.

The oldest term used to describe this form of service-delivery is telepsychiatry<sup>[7,18]</sup>. It is derived from the definition of telemedicine, and is a specific term designating psychiatric applications of telemedicine<sup>[7,8,19]</sup>. The National Library of Medicine defines telemedicine as "the use of electronic communication and information technologies to provide or support clinical care at a distance"<sup>[19]</sup>. Accordingly, telepsychiatry has been defined as the "use of electronic communication and information technologies to provide or support clinical psychiatric care at a distance"<sup>[20,21]</sup>. Though this term is intended to include all modalities of communication such as telephone, fax, e-mail, the internet, still imaging, and live two-way audio-visual communication, in effect the term is often equated with the provision of psychiatric services *via* tele-communication systems, which enable two-way interactive "real-time" communication between patients and providers<sup>[20]</sup>. Consequently, telepsychiatry is almost synonymously used with videoconferencing, which is a common form of this service-modality<sup>[7,22]</sup>. Nevertheless, broader definitions of telepsychiatry have also been proposed, in which it is defined as the

"electronic transmission of psychiatric consultations, advice or services in digital form, from one location to another using a data communication link provided by a third party carrier, or carriers, (and is) used to provide psychiatric services from a distance"<sup>[21]</sup>.

The terms tele care or telehealth care and its derivative telemental health care are of more recent origin. They are used to refer to "the provision of personalized health-care over a distance"<sup>[7,8,23]</sup>. Thus, tele-care is the remote or enhanced delivery of care to people in their own homes or community settings, by means of telecommunications and computerized services. It includes the use of sensors and alerts, which provide continuous, automatic and remote monitoring of care-needs, emergencies and lifestyle changes, and the use of ICTs to trigger human responses, or to prevent hazards. Telecare has historically been associated with social care, as distinct from telemedicine or telepsychiatry, which is more about medical care. Tele-care is, therefore, social care services delivered at home through remotely connected computerized medical devices<sup>[8,23]</sup>.

The term telemental health is a broader term, which includes all mental health applications including telepsychiatry and telemental health-care<sup>[7,8,21,22]</sup>. Though, telemental health also refers to the use of ICTs to provide mental health services from a distance, it incorporates the provision of a variety of mental health services from a wider range of professionals, and not just psychiatrists. Moreover, it refers to all forms of technology utilized in the practice of mental health-care from a distance. Such technology may be synchronous (real-time), as in video-conferencing or telephone-based systems, or asynchronous, as with e-mail, and other store-and-forward methods. Store-and-forward modes of communication involve acquiring medical data, and then transmitting this clinical information *via* e-mail or web-applications for later review by a specialist. Unlike synchronous forms of communication, asynchronous communication does not require the presence of both parties at the same time. The information can be transferred in the form of data, audio/video clips, or recordings. E-mail is the most commonly used form of asynchronous communication in telemedicine, and has the advantages of being relatively inexpensive, and not requiring any extra or special hardware support<sup>[24]</sup>. Finally, tele-mental-health also encompasses all forms of service, including both preventive and curative care, and educational and administrative services<sup>[7,8,10,21-23,25-27]</sup>.

The newest designation of telemental health is e-health or e-mental health. It also refers to the provision of health services to patients or to the lay public through any electronic medium, including the internet, telephone, or fax<sup>[7]</sup>. However, it is a more user-centred term, and refers not only to the use of a broad range of ICTs, but also a new way of service-provision, which involves a commitment to networked ways of improving health-care. A standard definition of e-health would, thus, include "the application of ICTs across the whole range of functions, which affect health-care, from

diagnosis to follow-up". Additionally, it is a method of delivering "responsive care, which is personalized and tailored to the needs of the user"<sup>[28,29]</sup>.

In this article, the term telepsychiatry has been used to refer to videoconferencing, while telemental health and e-health have been used interchangeably, in keeping with the broadest concept of this form of service-delivery.

## THE PURPOSE AND POTENTIAL

### APPLICATIONS OF TELEPSYCHIATRY

Telepsychiatry was originally devised to meet the mental health needs of users in remote, rural and inaccessible locations<sup>[2,10-19,21,22,25-27,29]</sup>. The use of telepsychiatry for remote communities helped overcome many of the disadvantages of traditional modes of service-delivery. Moreover, telepsychiatry could deliver a wide range of high-quality services, which were usually available only at specialist centres. Consequently, it created an equality of access, and a sense of empowerment among users from remote areas. Additionally, it diminished the cost of provision of services in isolated areas by saving on time and travel, not only for clinicians involved in the provision of care, but also for health-care professionals, and health-care users. Finally, it provided the means of supporting mental health professionals working in such remote environments.

With expansion of telepsychiatric services, they are also being increasingly used in urban areas, for the same reasons, *i.e.*, decreasing costs of care and enhancing access to high-quality care<sup>[10,13,14]</sup>. In recent years the number of patients who could benefit from telemental health services at home has also been growing. Moreover, with the development of a broader array of ICTs, telemental health services are being used to help those who are only mildly to moderately ill, and who may not require specialist care<sup>[8,23]</sup>.

Therefore, telepsychiatry can be as flexible as the practitioner, or the patient may need it to be. The range of services offered, the users of such services, and the points of delivery of such services is theoretically limitless. Tele-mental-health has both clinical or patient-care uses, and non-clinical applications such as administrative, learning and research activities<sup>[8,12,17,25-27,29]</sup>. The whole range of patient-care services, from assessment and diagnosis, to pharmacological and psychosocial interventions, and to follow-up and home-based care, is included in this mode of service-delivery. Telepsychiatry can also offer other services, such as development of clinical care plans, case management, crisis intervention, neuropsychological testing, legal aid, forensic evaluations, liaison services for other medical specialties, and nursing care. The settings, in which these services can be delivered, are equally diverse. They include inpatients, outpatients, emergency services, forensic settings, community settings, nursing homes, assisted living facilities, prisons, schools, and the homes of users. The patient population can vary from children,

to adults, to the elderly, and to special populations such as prison inmates or military personnel. Professional users can include all manner of mental health professionals such as local psychiatrists, trainee psychiatrists at distant sites, nurses, health workers and educators<sup>[2,8,10-14,17,19,22,25-27,29]</sup>. Telemental health is used routinely to give people access to educational events from remote locations. It can serve as a platform for net-based distant learning sources such as web-casting. Supervision of clinical management and psychotherapy is a major component of the educational uses of telemental health. Finally, a variety of administrative and managerial functions can be supported by telepsychiatry, helping in reducing the costs, time and travel involved in carrying out these tasks<sup>[8,26]</sup>.

## THE EVIDENCE FOR CLINICAL USEFULNESS OF VIDEOCONFERENCING-BASED TELEPSYCHIATRY

### *The size and quality of the evidence*

From somewhere around the year 2000, the evidence-base for telepsychiatry has begun to grow rapidly. It is instructive to follow the progress of some research groups around the world to get an idea of this growth. For example, researchers associated with the Medical University of South Carolina, Charleston, South Carolina, United States have published three reviews on the subject<sup>[17,30,31]</sup>. The first one, published in 2000<sup>[30]</sup>, covered the period from 1970 to 2000, and could locate only 63 publications, mainly pertaining to programme descriptions, reliability of videoconferencing assessments, and satisfaction and acceptance among users. The second review<sup>[31]</sup>, covering the period from 2000 to 2003 included 68 new publications in this three-year period. In addition to studies on novel programmes, research on reliability and satisfaction, clinical outcomes, cost-effectiveness, and legal, regulatory, and ethical issues had already begun to appear. The third review<sup>[17]</sup> covering the period from 2003 to 2008 came up with 148 new publications. This review noted that RCTs had demonstrated that videoconferencing was as efficacious as face-to-face patient-care in a variety of clinical settings, and with specific patient populations, although the number of such trials was still small. All three reviews and several others concluded that methodologically flawed studies were the norm, which was hampering the progress of research on telepsychiatry<sup>[16-18,30,31-34]</sup>. The experience of reviewers, post-2008 to date appears to be somewhat similar<sup>[2,8-10,12-14,35,36]</sup>. Although the number of research reports has continued to increase, RCTs are still very few. Videoconferencing-based approaches used to be the most common form of telemental health service till about ten years ago. With the development and proliferation of other ICTs, there is now a growing body of research on telephone, internet, or computer based interventions. Indeed the research-data on these modes of telemental health has outstripped that

available for videoconferencing<sup>[2,8-10,12,14,23,28,37-39]</sup>.

### **The nature of the evidence on videoconferencing-based telepsychiatry**

Methodological difficulties notwithstanding, telepsychiatry has undergone the most comprehensive examination of its utility<sup>[11]</sup>. Various aspects of efficacy and effectiveness of videoconferencing-based telepsychiatry are briefly reviewed in this section.

### **Diagnostic accuracy and reliability of videoconferencing-based assessments:**

A large number of studies have compared the accuracy and reliability of videoconferencing-based telepsychiatric assessments with face-to-face evaluations. A list of these studies is included in Table 1<sup>[40-79]</sup>. The table shows that these studies have been conducted in different disorders, using several different scales or structured interviews, among diverse populations such as children, adults, elderly and ethnic groups, and in different settings such as outpatients, inpatients, emergency services, residential and correctional facilities. They provide substantial evidence that on the whole there seems to be no difference between the reliability and diagnostic accuracy of telepsychiatric assessments, compared to face-to-face assessments. However, as is evident from Table 1, RCTs on this aspect, *i.e.*, studies in which subjects have been randomly assigned to either method of assessment are limited. Moreover, the role of factors such as bandwidth, objective vs subjective aspects of assessments, and reliability in certain populations, *e.g.*, the elderly with sensory deficits, is uncertain.

The reliability of telepsychiatric assessments has been the focus of interest of several reviews on the subject as well<sup>[2,7-10,12-14,25,29-34,80-85]</sup>. These have generally concluded that despite methodological limitations, videoconferencing-based assessments appear to be comparable to face-to-face evaluations. A meta-analysis on the reliability of telepsychiatric assessments found only 14 studies (with 380 adult patients), which had compared videoconferencing-based assessments with face-to-face evaluations directly using standardized instruments<sup>[84]</sup>. Despite the limited number of studies, there was no difference in accuracy or satisfaction between the two assessment modalities. Surprisingly, bandwidth did not appear to be a confounder, although there some suggestion that high bandwidth was better for more detailed observation of subjects. A later meta-analysis included studies, which had compared videoconferencing-based diagnosis with a non-telemedicine alternative by reporting a measure of agreement<sup>[85]</sup>. Most of these were in the field of dermatology, but 10 studies were from psychiatry, geriatrics, minor injuries, neurology and rheumatology. Reliability of diagnosis *via* videoconferencing was confirmed in all studies, but problems in study-designs were common. Finally, a more recent review, based on eight previous systematic reviews also concluded that diagnostic assessments conducted *via* videoconferencing

were equivalent to face-to-face assessments, but bandwidth and resolution were major factors, affecting the reliability of telepsychiatric assessments<sup>[2]</sup>. The reliability of tele-mental health assessments using other modalities such as telephones, or web-based tools has also been compared with face-to-face assessments<sup>[33,34,83,86]</sup>. Most of the evidence suggests that these methods are also as reliable as face-to-face evaluations, but the number of well-designed studies is still meagre (Table 1).

**Clinical outcomes:** Research-data from the initial studies comparing clinical outcomes between videoconferencing-based interventions and conventional treatment found both conditions to be equivalent across diverse populations, across all age groups, and on a wide range of outcome measures<sup>[17-19,30-32]</sup>. However, these studies lacked randomized-controlled designs; their samples were small and follow-up periods did not extend beyond six months. Moreover, outcomes were inferior for telepsychiatric interventions in certain populations, *e.g.*, those with substance abuse problems. Though later reviews on the subject also indicated positive and equivalent outcomes among patients undergoing telepsychiatric (principally videoconferencing) interventions, the small number of RCTs continued to remain a cause for concern<sup>[8-10,16,17,29,33-36]</sup>. Fortunately, since then the evidence has been shored up by several, large and well-designed trials, which have demonstrated either equivalent, or even superior outcomes in the groups receiving videoconferencing-based interventions. A list of RCTs of clinical outcomes with these interventions is included in Table 2<sup>[87-104]</sup>. It is evident from this table that though the number of RCTs is growing, the evidence-base for videoconferencing-based interventions is still a modest one. Moreover, the period of follow-up in these studies has seldom extended beyond one year; statistical methods to test outcome have not always been adequate; and, data on other measures such as service utilization, quality of life, and adherence are limited<sup>[2,10-14,22,35,36,39,83]</sup>. However, despite these methodological inadequacies, it would not be premature to conclude that the bulk of the evidence consisting of uncontrolled and controlled comparisons, as well as RCTs indicates that videoconferencing-based telepsychiatry is no less effective than traditional face-to-face treatment. More recently, the evidence from clinical trials has been supplemented by large-scale naturalistic studies. In one such study, Godleski *et al*<sup>[105]</sup> assessed clinical outcomes of 98609 patients with mental health disorders during six-month periods prior to, and after their enrolment in telemental health services of the United States Department of Veterans Affairs. The results showed a considerable decline in the rates of admissions and hospital stays among patients of both genders and all age groups following enrolment in telepsychiatric services (Table 2).

**Outcomes in specific disorders:** The literature on

**Table 1 Reliability of videoconferencing-based assessments: Comparisons with face-to-face evaluations**

Ref.	Patient group	Scale used	Study design	Results
Baer <i>et al</i> <sup>[40]</sup>	16 adults with OCD	YBOCS, HAM-D, HAM-A	Non-RCT	VC = F2F
Montani <i>et al</i> <sup>[41]</sup>	10 elderly psychiatric inpatients with no cognitive impairment	MMSE, CFT	Non-RCT	VC inferior to F2F
Montani <i>et al</i> <sup>[42]</sup>	15 elderly psychiatric inpatients with no cognitive impairment	MMSE, CFT	Non-RCT	VC inferior to F2F in certain aspects
Baigent <i>et al</i> <sup>[43]</sup>	63 adult inpatients	BPRS	Non-RCT	BPRS ratings similar; differences in ratings of affect
Zarate <i>et al</i> <sup>[44]</sup>	45 patients with schizophrenia	BPRS, SANS, SAPS	Non-RCT	Global severity and BPRS similar, SANS not reliably rated, higher BW better
Montani <i>et al</i> <sup>[45]</sup>	25 elderly psychiatric inpatients, 10 with dementia	MMSE, CFT	Non-RCT	VC inferior to F2F in non-cognitively impaired elderly; VC = F2F in those with dementia
Ruskin <i>et al</i> <sup>[46]</sup>	30 adult inpatients	SCID	Non-RCT	VC = F2F
Ball <i>et al</i> <sup>[47]</sup>	11 elderly psychiatric patients	CAMCOG	Non-RCT	VC = F2F
Ball <i>et al</i> <sup>[48]</sup>	99 responses of elderly psychiatric patients	MMSE	Non-RCT	VC = F2F
Stevens <i>et al</i> <sup>[49]</sup>	40 adult psychiatric patients	SCID	RCT	Similar satisfaction with both methods
Kirkwood <i>et al</i> <sup>[50]</sup>	27 inpatients with history of alcohol abuse	Neuropsychological battery	Non-RCT	Cognitive assessment by VC = F2F
Chae <i>et al</i> <sup>[51]</sup>	30 adult patients with schizophrenia	BPRS	Non-RCT	VC = F2F; BW did not matter
Elford <i>et al</i> <sup>[52]</sup>	23 children referred for psychiatric assessments	Semi-structured interview	RCT	VC = F2F
Jones <i>et al</i> <sup>[53]</sup>	30 elderly patients	BPRS	Non-RCT	Reliability better for objective than subjective items; BW did not matter
Yoshino <i>et al</i> <sup>[54]</sup>	42 adult inpatients with chronic schizophrenia	BPRS	Non-RCT	Reliability low with narrow BW
Grob <i>et al</i> <sup>[55]</sup>	27 elderly nursing home residents	BPRS, MMSE, GDS	Non-RCT	VC = F2F
Bishop <i>et al</i> <sup>[56]</sup>	24 adult psychiatric patients	CSQ	RCT	VC = F2F on patient satisfaction
Guilfoyle <i>et al</i> <sup>[57]</sup>	12 elderly nursing home residents	Health assessments	Non-RCT	VC = F2F
Loh <i>et al</i> <sup>[58]</sup>	20 elderly psychiatric patients	MMSE, GDS	Non-RCT	VC = F2F
Kobak <sup>[59]</sup>	42 patients with mood disorders	HAM-D	Non-RCT	VC = F2F
Poon <i>et al</i> <sup>[60]</sup>	22 community-dwelling elderly with mild dementia or mild cognitive impairment	MMSE, RBMT, HDS	RCT	VC = F2F
Cullum <i>et al</i> <sup>[61]</sup>	33 elderly with mild cognitive impairment or dementia	Neuropsychological battery	Non-RCT	VC = F2F
Lexcen <i>et al</i> <sup>[62]</sup>	72 adult psychiatric patients in forensic settings	BPRS, Mac CAT-CA	Non-RCT	VC = F2F
Loh <i>et al</i> <sup>[63]</sup>	20 elderly patients with dementia	MMSE, GDS and other scales	Non-RCT	VC = F2F
Martin-Khan <i>et al</i> <sup>[64]</sup>	42 patients over 50 yr referred for cognitive assessment	Neuropsychological battery	Non-RCT	VC = F2F
Singh <i>et al</i> <sup>[65]</sup>	37 adult patients with psychiatric disorders	DSM-IV	RCT	VC = F2F
Shore <i>et al</i> <sup>[66]</sup>	53 male American Indian veterans with psychiatric disorders	SCID	RCT	VC = F2F
Manguano-Mire <i>et al</i> <sup>[67]</sup>	21 inpatients from a forensic psychiatric facility	GCCT-MSH	RCT	VC = F2F
Kobak <i>et al</i> <sup>[68]</sup>	35 adult patients with mood disorders	MADRS	Non-RCT	VC = F2F
McEachern <i>et al</i> <sup>[69]</sup>	71 elderly patients from a memory clinic	MMSE	RCT	VC = F2F
Ciemins <i>et al</i> <sup>[70]</sup>	73 elderly patients with diabetes	MMSE	Non-RCT	VC = F2F
Porcari <i>et al</i> <sup>[71]</sup>	20 male veterans with PTSD	CAPS	Non-RCT	VC = F2F
Thompson <i>et al</i> <sup>[72]</sup>	138 transplant recipients receiving follow-up	CES-D	RCT	VC = F2F
Morgan <i>et al</i> <sup>[73]</sup>	169 elderly from a memory clinic	Satisfaction assessment	RCT	Similar satisfaction with both methods
Stain <i>et al</i> <sup>[74]</sup>	11 adolescents/young adults (14-30 yr) with early psychosis	Diagnosis, quality of life, neurocognition on standardized scales	Non-RCT	VC = F2F
Bui <sup>[75]</sup>	30 undergraduates with subclinical OC symptoms	YBOCS	Non-RCT	VC = F2F
Martin-Khan <i>et al</i> <sup>[76]</sup>	205 patients over 50 yr referred for cognitive assessment	Neuropsychological battery	Non-RCT	VC = F2F
Wong <i>et al</i> <sup>[77]</sup>	42 elderly psychiatric inpatients	RUDAS	Non-RCT	VC = F2F
Seidel <i>et al</i> <sup>[78]</sup>	73 adult psychiatric patients in emergency settings	Interview	RCT	VC = F2F
Litwack <i>et al</i> <sup>[79]</sup>	75 veterans with PTSD	CAPS	Non-RCT	VC = F2F

F2F: Face to face or in-person assessment; VC: Videoconferencing; BW: Bandwidth; RCT: Randomized controlled trial (*i.e.*, a study in which patients were randomly assigned to VC or F2F assessment); OCD: Obsessive compulsive disorder; PTSD: Posttraumatic stress disorder; YBOCS: Yale-Brown Obsessive-Compulsive Scale; HAM-D: Hamilton Rating Scale for Depression; HAM-A: Hamilton Rating Scale for Anxiety; BPRS: Brief Psychiatric Rating Scale; SANS: Scale for the Assessment of Negative Symptoms; SAPS: Scale for the Assessment of Positive Symptoms; SCID: Structured Clinical Interview for DSM-III-R; MMSE: Mini-Mental State Examination; GDS: Geriatric Depression Scale; RBMT: Rivermead Behavioural Memory test; HDS: Hierarchic Dementia Scale; CSQ: Client Satisfaction Questionnaire; CFT: Clock Face Test; RUDAS: Rowland Universal Dementia Assessment Scale; CAPS: Clinician-Administered PTSD Scale; MADRS: Montgomery-Asberg Depression Rating Scale; Mac CAT-CA: MacArthur Competence Assessment Tool-Criminal Adjudication; CES-D: Center for Epidemiologic Studies-Depression; GCCT-MSH: Georgia Court Competency Test-Mississippi State Hospital revision.

**Table 2 Outcome of videoconferencing-based interventions: Randomized-controlled trials of comparisons with face-to-face interventions**

Ref.	Patient group	Treatment details	Outcome measures	Results
Day <i>et al</i> <sup>[87]</sup>	80 adult clients with a wide range of problems, from weight concerns to personality disorders	5 sessions of CBT	BSI, GAF, TC and working alliance and satisfaction scales	VC = F2F treatment on outcome and process measures
Nelson <i>et al</i> <sup>[88]</sup>	28 children 8-14 yr with DSM-IV depression	Eight weekly CBT sessions with child and parent	KSADS-P, CDI, satisfaction questionnaire	VC = F2F treatment on depression scores and satisfaction
Ruskin <i>et al</i> <sup>[89]</sup>	119 adult patients with depression according to SCID with HAM-D scores greater than 16	Eight sessions over a 6 mo; medication, psychoeducation, brief supportive counseling	Treatment response, adherence, patient and psychiatrist satisfaction, cost effects	VC = F2F treatment on all aspects; costs same if travel considered
Bouchard <i>et al</i> <sup>[90]</sup>	21 adult patients with panic disorder and agoraphobia according to SCID	Weekly CBT for 12 wk; follow-up for 6 mo	Self-assessment and ratings on anxiety and disability scales	VC = F2F treatment on symptom reduction, functioning and alliance
Poon <i>et al</i> <sup>[60]</sup>	22 community-dwelling elderly with mild dementia or mild cognitive impairment	Cognitive intervention programme for older patients	MMSE, RBMT, HDS	VC = F2F treatment in terms of cognitive improvement
De Las Cuevas <i>et al</i> <sup>[91]</sup>	140 adult psychiatric outpatients; ICD-10 diagnoses as per CIDI	8 consultations over 24 wk; medication and CBT	CGI-S and CGI-I, SCL-90R	VC = F2F treatment on symptom reduction
O'Reilly <i>et al</i> <sup>[92]</sup>	495 adult psychiatric patients	Medication management, psychoeducation, supportive counseling, triage to other local services	BSI, CSQ-8, SF-36, satisfaction	VC = F2F treatment on symptom reduction and satisfaction; VC 10% less expensive per patient
Fortney <i>et al</i> <sup>[93]</sup>	395 adult primary care patients with PHQ-9 depression severity scores $\geq$ 12	Medication management and psychotherapy for 12 mo	Antidepressant prescribing, medication adherence, treatment response and remission health status, quality of life and satisfaction on standardized scales	VC > F2F treatment on mental health status, health-related quality of life, and satisfaction
Frueh <i>et al</i> <sup>[94]</sup>	97 adult patients with combat-related PTSD	14 weekly treatment sessions for 3 mo	Self-report, symptom severity, BDI, SCL, satisfaction, adherence and other process measures	VC = F2F treatment on symptom-severity and satisfaction
Hilty <i>et al</i> <sup>[95]</sup>	121 adult patients with depression according to SCID	Intensive modules using telepsychiatric educational interventions provided by primary-care providers	BDI, SCL, SF-36	VC = F2F treatment on symptom reduction; VC > F2F on satisfaction and retention
Mitchell <i>et al</i> <sup>[96]</sup>	128 adults with DSM-IV bulimia nervosa or other eating disorders; binge eating or purging at least once per week	20 sessions of manual-based, CBT for bulimia over 16 wk	HAM-D, BDI, self-esteem, quality of life, functioning, alliance and symptom-severity	VC = F2F treatment on most measures
Thompson <i>et al</i> <sup>[72]</sup>	138 adult transplant recipients with depression; CES-D score > 16	Medications and counseling over 12 mo	CES-D	VC = F2F treatment on symptom reduction
Morland <i>et al</i> <sup>[97]</sup>	125 adult male veterans with PTSD according to SCID	Anger management therapy - 12 session CBT intervention over 6 wk; follow-up for 6 mo	CAPS, STAXI-2, NAS-I, attrition, adherence, satisfaction and alliance assessments	VC = F2F treatment on anger reduction and process variables; alliance better in F2F treatment
Chong <i>et al</i> <sup>[98]</sup>	167 adult Hispanic patients with major depression	Monthly telepsychiatry sessions for 6 mo; medications and counselling	Appointment adherence, alliance, satisfaction, antidepressant use, depression and functional outcomes	VC > F2F treatment on adherence, alliance, satisfaction; VC = F2F treatment on depression and functional outcomes
Moreno <i>et al</i> <sup>[99]</sup>	167 adult Hispanic patients with major depression according to PHQ-9 and MINI	Medication management and counseling for 6 mo	PHQ-9, MADRS, Q-LES-Q, SDS	VC > F2F treatment on all outcomes
Dunstan <i>et al</i> <sup>[100]</sup>	6 adults with anxiety or mixed anxiety-depressive disorder	6-8 sessions of CBT; 1-mo follow-up	Self-reports and symptom-severity	VC = F2F treatment
Fortney <i>et al</i> <sup>[101]</sup>	364 adult patients with major depression according to PHQ-9 and MINI	Telemedicine-based collaborative care <i>vs</i> practice-based collaborative care for 18 mo; medication management and psychosocial treatment	Depression outcomes module, HSCL, QOL-DTA, DSSS, DHBI	VC > F2F treatment on depression outcomes
Stubbings <i>et al</i> <sup>[102]</sup>	26 adult patients with mood or anxiety disorder according to SCID	12 sessions of CBT; 6-wk follow-up	Symptom-severity, self-reports, alliance, quality of life and satisfaction on standardized scales	VC = F2F treatment on all outcome measures

Choi <i>et al</i> <sup>[103]</sup>	158 homebound individuals > 50 yr with depression, HAM-D score > 15	PST-telehealth problem-solving therapy <i>vs</i> IP-PST; 6 PST sessions over 6 wk; follow-up for 36 wk	HAM-D, WHODAS	VC = F2F treatment, but VC effects more sustained
Choi <i>et al</i> <sup>[104]</sup>	121 homebound individuals > 50 yr with depression, HAM-D score > 15	PST-telehealth problem-solving therapy <i>vs</i> IP-PST; 6 PST sessions over 6 wk; follow-up for 24 wk	Acceptability on the TEL, HAM-D	VC = F2F treatment

VC treatment: Treatment through videoconferencing; F2F treatment: Face-to-face or in-person treatment; CBT: Cognitive behavioral therapy; PTSD: Post-traumatic stress disorder; HAM-D: Hamilton Rating Scale for Depression; SCID: Structured Clinical Interview for DSM-IV; KSADS-P: Schedule for Affective Disorders and Schizophrenia for School Age Children-Present Episode; CDI: Children's Depression Inventory; MMSE: Mini-Mental State Examination; RBMT: Rivermead Behavioural Memory test; HDS: Hierarchic Dementia Scale; CIDI: Composite International Diagnostic Interview; CGI-S and CGI-I: Clinical Global Impressions-Severity of Illness and Improvement; SCL: Symptom Checklist; BSI: Brief Symptom Inventory; CSQ: Client Satisfaction Questionnaire; SF-36: Medical Outcomes Study Short Form; PHQ: Patient Health Questionnaire; BDI: Beck's Depression Inventory; CES-D: Center for Epidemiologic Studies-Depression; MPSS: Modified PTSD Symptom Scale; BAI: Beck Anxiety Inventory; CAPS: Clinician-Administered PTSD Scale; STAXI-2: State-Trait Anger Expression Inventory-2; NAS-T: Novaco Anger Scale total score; MINI: Mini-International Neuropsychiatric Interview; PHQ-9: Patient Health Questionnaire-nine item version; MADRS: Montgomery-Åsberg Depression Rating Scale; Q-LES-Q: Quality of Life Enjoyment and Satisfaction Questionnaire; SDS: Sheehan Disability Scale; HSCL: Hopkins Symptom Checklist; QOL-DTA: Quality Improvement for Depression Treatment Acceptability scale; DSSS: Duke Social Support and Stress Scale; DHBI: Depression Health Beliefs Inventory; WHO: World Health Organization; WHODAS: WHO Disability Assessment Schedule; TEL: Treatment Evaluation Inventory; GAF: Global Assessment of Functioning; TC: Target Complaints method.

the outcome of telepsychiatric interventions in specific psychiatric disorders till around the mid-2000s consisted only of small non-randomised studies; consequently, conclusions about effectiveness of telepsychiatry in these conditions were uncertain<sup>[17,18,30,31]</sup>. Since then RCTs or controlled trials have been conducted with almost all common disorders including depression, anxiety disorders (panic disorders, phobias, obsessive compulsive disorder, and post-traumatic stress disorder), eating disorders, substance abuse, psychosis, dementia, and suicide prevention.

(1) Depressive disorders. RCTs comparing outcomes among patients with depressive disorders included in Table 2 show that treatment delivered by videoconferencing is equivalent to face-to-face treatment on symptom reduction and a range of other outcomes<sup>[72,88,89,95,103,104]</sup>. Indeed, in several instances videoconferencing treatment has actually turned out to be superior to face-to-face treatment on depression outcomes<sup>[93,98,99,101]</sup>. Two literature reviews have provided further support for the utility of videoconferencing-based telepsychiatry in the treatment of depression<sup>[106,107]</sup>. One of these reviews was based on ten RCTs of different videoconferencing, telephone, internet and computer based treatments of depression<sup>[107]</sup>. Although the authors noted that there was limited data about the effectiveness of telemental health interventions in depression, they concluded that videoconferencing-based treatments yielded the same results as face-to-face treatment. Despite the more recent large-scale RCTs on videoconferencing-based treatments in depression, the evidence-base is still comparatively smaller than other telemental health interventions for depression, such as telephone, internet, or computer based treatments<sup>[33,34,108-112]</sup>.

(2) Anxiety disorders. A few RCTs have demonstrated the efficacy of videoconferencing-based treatments in anxiety disorders<sup>[100,102]</sup> including panic disorder and agoraphobia<sup>[90]</sup>, but the numbers involved

have usually been small. A meta-analysis of 13 studies, one of which used videoconferencing-based treatment for anxiety and depressive disorders, indicated that such interventions could be more effective in anxiety than depressive disorders<sup>[112]</sup>. A recent literature review concluded that videoconferencing and telephone-based treatments can be equally effective as face-to-face treatments of obsessive compulsive disorder<sup>[113]</sup>. As with the literature on depression, the number of RCTs for telephone, internet or computer based therapies for anxiety disorders are much larger than those with videoconferencing-based treatments<sup>[33,34,108-112]</sup>.

(3) Post-traumatic stress disorder. Some RCTs have compared the efficacy of videoconferencing-based interventions with face-to-face treatments in post-traumatic stress disorder (PTSD)<sup>[94,97]</sup>, and have found these to be equally efficacious. RCTs favouring videoconferencing-based treatments of PTSD have been supplemented by non-randomized controlled trials with extended periods of follow-up with similar results<sup>[114,115]</sup>. Other aspects of treatment such therapeutic alliance, levels of attrition and compliance, patients' satisfaction, clinicians' satisfaction and patients' retention of information have been compared both in RCTs<sup>[116]</sup> and controlled trials<sup>[117]</sup>, and have been found to be similar in both treatment conditions. The efficacy of videoconferencing-based interventions in PTSD has also been endorsed by literature reviews of the subject<sup>[118]</sup>, and a meta-analysis of telehealth interventions<sup>[119]</sup>.

(4) Eating disorders. A RCT comparing cognitive behaviour therapy (CBT) for bulimia and other eating disorders delivered *via* videoconferencing with face-to-face treatment found both treatments to be similar on reduction of eating disorder and depression symptoms, self-esteem, quality of life, functioning and therapeutic alliance<sup>[96]</sup>. Other aspects of treatment such as cost-effectiveness and therapeutic factors affecting treatment were also found to be equivalent between the two treatment-conditions<sup>[120,121]</sup>.

(5) Substance abuse. Although several reviews have concluded that videoconferencing-based treatments have considerable potential to be of use in treatment of alcohol and other substance-use problems, there is no RCT on videoconferencing-based treatment of these disorders. Instead, a number of RCTs of telephone, internet, or computer based treatments have been conducted, which have shown that such interventions compare well with face-to-face treatment<sup>[33,34,108,122]</sup>.

(6) Schizophrenia. Video-conferencing-based telepsychiatric studies of schizophrenia consist of programme descriptions, case reports, and controlled trials<sup>[33,34,108,123-125]</sup>. These have shown that schizophrenia can be reliably diagnosed and assessed using videoconferencing, and treatment using this modality results in improved clinical outcome and high rates of satisfaction among patients. However, there are no RCTs comparing videoconferencing with face-to-face treatment. On the other hand, a number of telehealth and e-health studies using randomized designs have yielded positive outcomes in terms of clinical improvement, improved adherence, increased awareness, and self-management interventions<sup>[124,125]</sup>.

(7) Suicide prevention. Studies of suicide risk assessment and monitoring have shown that videoconferencing is as effective as face-to-face assessments<sup>[78,126,127]</sup>. A review of telehealth interventions found these to be effective not only in assessment, but also in interventions to prevent suicide<sup>[127]</sup>. However, most trials were of telephone or web based interventions, and the number of RCTs was limited. Concerns about safety of remote assessments have also been raised.

**Outcomes in specific populations:** (1) Children and adolescents. The field of telepsychiatry services for children and adolescents is still a developing one. However, several reviews have noted that the results of studies till date are encouraging<sup>[81,108,128-136]</sup>. Videoconferencing-based approaches among children and adolescents have shown that these are equivalent to face-face methods in diagnosing childhood psychiatric disorders. High satisfaction has been noted among children and their parents, and comparable clinical outcomes have also been demonstrated. Videoconferencing-based studies report positive findings for health care practitioners, time and cost savings, and improvement in quality of care. Nevertheless, the bulk of the evidence consists mostly of programme descriptions, case studies and non-randomized trials. Only three RCTs of videoconferencing have been conducted, one of diagnostic reliability, another of treatment of childhood depression with CBT, and the third on the effectiveness of videoconferencing in teaching training skills to parents of children with attention deficit hyperkinetic disorder<sup>[52,88,137]</sup>. Another ongoing RCT of videoconferencing-based treatment for attention deficit hyperkinetic disorder has yielded promising results<sup>[136]</sup>. Therefore, although videoconferencing appears to hold great promise as a mode of mental health-care service

for children and adolescents, there is a need for well-designed and properly controlled trials to evaluate its usefulness.

(2) The elderly. Telepsychiatry has a special role in the mental health care of the elderly because they account for a large proportion of patients from rural and remote locations, and often have multiple, chronic conditions, which limits their access to high-quality, specialized care<sup>[138]</sup>. There is a wealth of literature on videoconferencing-based assessments of mental state and cognitive function, which clearly shows that these assessments are as reliable as face-to-face interviews in elderly patients, even in those with cognitive impairment<sup>[82,108,138-140]</sup>. However, most studies are not adequately designed, and there are very few RCTs comparing videoconferencing-based with face-to-face assessments<sup>[60,69,82,139,140]</sup>. Similarly, though several descriptive and uncontrolled studies have demonstrated improved outcome with videoconferencing-based interventions<sup>[138-140]</sup>, there is only one RCT with 22 patients with dementia, which has shown the benefits of a videoconferencing-based cognitive intervention for these patients<sup>[60]</sup>.

(3) Forensic and correctional settings. Telepsychiatry has obvious advantages while delivering mental health-care for inmates of prisons and other correctional settings, a large proportion of who suffer from mental health disorders<sup>[10,12,16,17,141-144]</sup>. Videoconferencing-based assessments have proved to be as reliable as face-to-face assessments in forensic settings, but much of the evidence for this derives from uncontrolled studies. Similarly, though telepsychiatry appears to increase access for prison inmates, leads to high satisfaction among them, and cost savings for providers, the evidence for these outcomes and for the clinical effectiveness of videoconferencing-based interventions in forensic settings is almost always derived from case reports, descriptive studies and uncontrolled trials<sup>[141-144]</sup>.

(4) Emergency settings. The application of telepsychiatry for assessment and treatment of patients attending the emergency department with mental health problems is another emerging area. Till date there are a few descriptions of programmes being run in emergency settings and case reports of patients treated in such settings<sup>[108,145,146]</sup>. These have indicated that videoconferencing is a safe and effective way of delivering services in this area, and patients and staff express high satisfaction with such services. These findings were endorsed by a recent RCT, which found that videoconferencing-based diagnoses were as reliable as face-to-face ones, and the two modes were similar on recommendations about disposition and ratings of dangerousness or suicidality<sup>[78]</sup>.

(5) Ethnic populations. Telepsychiatry is being increasingly used worldwide to provide services to ethnic minorities including American-Indians and the Hispanic community in the United States, aboriginal communities, and Asian and African people<sup>[2,108,147-149]</sup>. Providing culturally appropriate care is a particular challenge for

these up-and-coming telepsychiatric programmes, because the cultural background of patients from ethnic minorities influences their perceptions about technology and the patient-provider relationship<sup>[108,147,148]</sup>. Nevertheless, a number of RCTs have documented the reliability of videoconferencing-based assessments, as well as feasibility, acceptability and effectiveness of telepsychiatric services among American-Indian veterans and Hispanic communities<sup>[66,98,99]</sup>. Then again, a recent systematic review of provision of counselling for depression in ethnic minorities through telephone, internet or videoconferencing-based services concluded that more methodologically rigorous studies of use among ethnic minorities were required<sup>[150]</sup>.

**Psychotherapy outcomes:** The usefulness of videoconferencing in conducting effective psychological treatment has gained widespread acceptance. A number of psychosocial interventions can be delivered *via* videoconferencing including CBT, psychotherapy, behaviour therapy, psychoeducation, family therapy and rehabilitation. CBT is the best researched modality, and has been used in different psychiatric disorders, as well as different patient populations. CBT may be particularly well suited to videoconferencing, because it is usually brief, more structured, and less dependent on the therapeutic relationship as other insight-oriented therapies. Thus, it is less likely to be affected by the potential technological limitations of videoconferencing<sup>[83]</sup>. Videoconferencing-based CBT has been compared in a number of RCTs with face-to-face CBT in different disorders, and has proved to be equally effective<sup>[87,88,90,91,96,97,100,102-104]</sup>. However, the number of such RCTs is still small, and most trials have been conducted with relatively small sample sizes. A meta-analysis identified 13 RCTs, one of which was a trial on videoconferencing-based CBT, and found positive outcomes favouring telephone, internet and videoconferencing-based therapies for anxiety and depressive disorders. Not surprisingly, the lack of RCTs and direct comparisons with face-to-face treatments meant that the evidence was considered to be only preliminary<sup>[112]</sup>. Psychotherapy other than CBT *via* videoconferencing has also been the focus of several trials<sup>[151]</sup>. A recent systematic review of videoconferencing-based psychotherapy identified 65 studies in this area<sup>[152]</sup>. It concluded that such psychotherapy was a feasible option for treatment, lent itself to a variety of therapeutic modalities, was useful in different disorders and patient populations, and was associated with high satisfaction among users. Moreover, it appeared to be as effective as face-to-face psychotherapy, though more large-scale clinical trials were needed to further assess the efficacy and effectiveness of videoconferencing-based psychotherapy. Videoconferencing has also been used to conduct behavioural treatments such as exposure and response prevention<sup>[153]</sup>, family therapy<sup>[154]</sup>, and rehabilitation of patients with chronic conditions<sup>[155]</sup>, but the number of

such trials is fewer. In contrast to the somewhat limited literature on videoconferencing-based psychosocial treatments, a large number of telephone- and internet-based (web-based interventions or online counselling) studies, principally of CBT, have been conducted till date. Several meta-analyses and systematic reviews of this extensive literature have shown that such treatments are equally effective as conventional CBT<sup>[110,156-160]</sup>. However, direct comparisons with face-to-face CBT are still rare, and not all of these trials are methodologically sound either<sup>[160]</sup>.

### **The doctor-patient relationship and therapeutic alliance:**

An important variable in telepsychiatric interventions is the impact of telepsychiatry on the doctor-patient relationship, and the ability to establish rapport with patients through videoconferencing links<sup>[161]</sup>. It has been proposed that the way doctors and patients communicate with one another through telepsychiatric links affects the outcome of the videoconferencing-based treatment<sup>[162]</sup>. Additionally, in therapeutic settings, one of the primary concerns is about the perceived difficulty of developing an effective therapeutic relationship in the absence of non-verbal cues, particularly since the therapeutic alliance plays a crucial role in the outcome of psychotherapy<sup>[161]</sup>. Telepsychiatry appears to have both positive and negative effects on communication, with technological standards being a key confounding variable<sup>[18]</sup>. The two major issues, which have the potential to impact the rapport between the doctor and the patient and the therapeutic alliance, are the difficulty in detecting non-verbal cues, and the lack of physical proximity and physical presence<sup>[83]</sup>.

A preliminary review on the subject of the doctor-patient relationship concluded that though relationship building appeared possible *via* telepsychiatry, it had disadvantages compared to face-to-face care, which were not fully understood<sup>[163]</sup>. However, another series of reviews concluded otherwise<sup>[162,164,165]</sup>. The first review of 38 studies compared the nature and content of doctor-patient communication in videoconferencing-based telemedicine in different specialties, with the bulk of studies being from psychiatry, otolaryngology, and dermatology. The findings from each study were coded according to 23 categories, and a positive and negative rating assigned to each of the communication results. Approximately 80% of the findings favoured the doctor-patient interaction *via* telemedicine, with all but two (non-verbal behaviour and lack of touch) of the 23 categories analyzed reporting more positive than negative results<sup>[164]</sup>. These findings were replicated by subsequent reviews, which included 57 and 61 studies respectively, exclusively in the domain of videoconferencing-based telepsychiatry<sup>[162,165]</sup>.

Several other reviews have also addressed the subject of therapeutic alliance in telepsychiatry, and concluded that despite methodological limitations, the available literature supports the capability of therapists to develop a therapeutic alliance through videoconferencing

<sup>[18,83,161]</sup>. Additionally, several RCTs comparing videoconferencing-based psychosocial interventions (principally CBT) with face-to-face treatment, have found no differences in the quality of the therapeutic alliance between the two conditions<sup>[87,96,97,102]</sup>. Finally, a recent systematic review of 11 studies examined the therapeutic alliance in e-therapy for mental health, including videoconferencing-based treatment. It concluded that e-therapy seemed equivalent to face-to-face therapy in terms of therapeutic alliance, and that there was a positive association between the therapeutic alliance and e-therapy outcome. However, the authors also noted that because of the limited amount of evidence, definitive conclusions could not be made<sup>[166]</sup>.

**Patient and provider satisfaction:** Patient and provider satisfaction with telepsychiatry are two outcomes of interest, which have attracted the maximum research attention<sup>[2,8,10,13,17,18,31,83,108,163,167]</sup>. The most consistently reported findings are the high levels of satisfaction and acceptance among patients. These have been found in virtually every study assessing patient satisfaction with telepsychiatric services, with up to 75% to 100% of the users reporting considerable satisfaction with telepsychiatric care. High satisfaction has been noted for all patient populations (children, adults, elderly, ethnic minorities, prison populations) and all kinds of psychiatric diagnoses. Levels of satisfaction with telepsychiatry are comparable to other branches of telemedicine. Systematic reviews of telemedicine studies, which have included telepsychiatric interventions, have endorsed this finding of high levels of satisfaction among patients<sup>[168-170]</sup>. A number of RCTs of videoconferencing-based assessments or interventions have also reported similar levels of patient satisfaction in telepsychiatric vs face-to-face care<sup>[35,49,56,67,87-89,92-94,96-98,104,107]</sup>.

Despite these overwhelmingly positive responses from patients, a cautious interpretation of the evidence has been recommended, because of several methodological and conceptual problems afflicting research in this area<sup>[17,18,31,83,108,167,168-170]</sup>. Firstly, satisfaction is not a very robust indicator of outcome, since in certain instances patients may be satisfied with the care provided despite not benefitting from it. Secondly, the lack of good quality evidence in this area has also been a problem, along with conceptual problems in defining satisfaction. Finally, patient satisfaction might not always imply patient preference; other things being equal, most patients may still prefer face-to-face contact and care. Patients opt for telepsychiatry when it reduces travel, waiting times, absence from work, and costs, and when it enhances their sense of autonomy. Moreover, other factors may determine patient satisfaction, including clinical and demographic variables, severity and type of the disorder, and the availability and quality of telepsychiatric services<sup>[17,18,31,83]</sup>.

Provider and consultee satisfaction has been less well evaluated. The results of such studies are usually

mixed, but on the whole provider satisfaction appears to be lower than patient satisfaction with telepsychiatry<sup>[2,8,10,13,17,18,31,83,108,163,167,170]</sup>. This is perhaps reflected in the poor uptake and somewhat negative attitudes concerning telepsychiatry among clinicians. Telepsychiatry might not appeal to some clinicians because of the perceived difficulties in many areas such as communication or rapport building, and uncertainty about legal, regulatory and ethical issues<sup>[12,38]</sup>.

**Cost-effectiveness:** The issue of costs and cost-effectiveness is at the heart of the debate about the viability of telepsychiatric services<sup>[31]</sup>. However, the assessment of cost-effectiveness of telepsychiatric services has proved to be challenging for several reasons<sup>[17,83]</sup>. Comprehensive evaluations of cost-effectiveness ideally covering both direct and indirect costs under several heads such as operating costs, costs to patients and providers, as well as societal costs, are difficult to conduct. Consequently, there are considerable differences across studies, both with respect to their designs, and in the methods used for analysis of costs<sup>[10,12,14,17,18,83,108]</sup>. Moreover, costs are dependent on technology, which evolves much faster than the methods used to estimate cost-effectiveness<sup>[17,18,83]</sup>. Due to these difficulties the quality of the existing evidence on cost-effectiveness of telepsychiatry is extremely variable. Early reviews of cost-effectiveness of telemedicine services concluded that these methodological flaws and the lack of appropriate outcome measures in existing studies made it difficult to determine cost-effectiveness<sup>[171]</sup>. In subsequent reviews of videoconferencing-based telepsychiatry, the evidence seemed to favour telepsychiatric services, but the limited number of good quality studies meant that cost-effectiveness of telepsychiatry could not be unequivocally demonstrated<sup>[18,31,172,173]</sup>. Since then, RCTs of videoconferencing-based interventions have mostly found that telepsychiatric care is either similar, or even better than traditional modes of care in terms of cost-effectiveness<sup>[66,89,92,120]</sup>. However, certain other RCTs have found videoconferencing to be the more expensive option<sup>[93,101,174]</sup>. Accordingly, recent reviews on the subject though finding evidence in favour of telepsychiatry services indicate that the results could depend on a number of moderators such as the study-design, the type of service being offered, the population in question, the technology being used, and the kinds of costs being examined<sup>[2,10,12,14,17,83,108,167,171,175]</sup>. Travel costs and the volume of telepsychiatric consultations have been examined in a number of studies. "Break-even point" analyses have suggested that a weekly volume of 7 to 14 consultations and travel-distances greater than 30 kilometres or so, determine whether a particular telepsychiatric service will prove to be cost-effective or not. One way of reducing set-up and operating costs could be to utilize the telepsychiatric equipment for other clinical, administrative and educational purposes<sup>[8,10,12,14,17,18,29,31,83,108,167,171,172]</sup>.

**Access to care and empowerment:** Much like the evidence on high patient satisfaction, there is unequivocal evidence that telepsychiatry increases access to high-quality mental health-care for several populations, who may have lacked such care in the past<sup>[2,8,10,12,14,17,18,83,108]</sup>. It effectively removes several barriers to care such as distance, transportation difficulties, time limitations, costs, safety, and stigma. Consequently, it reduces inequities in care faced by many patients, and leads to a sense of empowerment among them. Therefore, videoconferencing for clinical purposes though originally intended to serve patients in remote and inaccessible locations, is being increasingly used nowadays to enhance access for urban patient populations as well.

**Other outcomes:** Other aspects of utility and feasibility of videoconferencing-based telepsychiatry have received much less research attention, though improvements in treatment-adherence, social functioning and quality of life have generally been found to be similar to face-to-face interventions in some RCTs<sup>[89,92-99,101-104]</sup>.

## LIMITATIONS AND CONSTRAINTS OF TELEPSYCHIATRY

Videoconferencing-based telepsychiatry has been around for more than six decades now. During this time an extensive body of evidence has accumulated favouring the usefulness of this mode of service-delivery. However, there appears to be a large gap between the research-evidence and the use of telepsychiatry in routine health-care. A number of studies and reviews have focused their attention on the problem of limited clinical uptake of videoconferencing<sup>[9-14,17,18,29,34,83,108,176,177]</sup>. Barriers to the routine clinical use of telepsychiatry include methodological problems, technological hindrances, clinician or provider barriers, issues regarding safety, security and confidentiality, regulatory issues, ethical and legal concerns, and the lack of evidence on sustainability and benefits of integrating telepsychiatric services into existing mental health-care systems. Methodological concerns of the research on effectiveness of telepsychiatry, such as the lack of high-quality RCTs have already been alluded to. The lack of cost-effectiveness data is another major hindrance to obtaining funding for establishing new programmes. Although technology has developed rapidly, the equipment needed for starting a service is still expensive, and difficult to maintain. Problems like connectivity, and compatibility of different systems used (referred to as interoperability) are also quite common<sup>[12]</sup>. Provider skepticism is another major factor limiting acceptance. Studies have found that after controlling for other barriers, *e.g.*, reimbursement and regulatory issues, negative attitudes of clinicians and institutions are the most significant barriers affecting use of telepsychiatric services<sup>[34]</sup>. Poor satisfaction with telepsychiatry among clinicians may arise from concerns about establishing rapport

and a successful therapeutic alliance with patients, discomfort with technology, inadequate training, and the perception that telepsychiatry might add to, rather than alleviate their clinical burden<sup>[176-178]</sup>. Concerns about safety also predominate, although several reviews have indicated that the telepsychiatry is safe, even in relatively unsupervised settings, and does not have any negative outcomes<sup>[108,179,180]</sup>. Concerns about security of the systems overlaps with issues of confidentiality, privacy and consent of patients. Other issues such as requirements for licensing and reimbursement are yet to be resolved fully<sup>[108,181,182]</sup>. Finally, there is hardly any evidence on sustainability and benefits of integrating telepsychiatric services into the conventional systems of mental health care<sup>[17,83,176]</sup>. This usually means that new programmes survive only till they are promoted by enthusiastic local champions who are able to overcome scepticism among providers and attract funding from health-care authorities<sup>[176]</sup>.

## TELEPSYCHIATRY IN LOW- AND MIDDLE-INCOME COUNTRIES

Despite being largely successful elsewhere, telepsychiatry is yet to make its mark in low- and middle-income countries of the developing world. This is surprising given that telepsychiatric services are ideally suited for delivery of mental health-care in such settings, where traditional means of mental health-care are often unable to cope with the large gap between demand and resources for care, and the inequitable distribution of health-care resources between urban and rural areas<sup>[2,15,22,183]</sup>. Nevertheless, research in telepsychiatry from these countries has generally consisted of scattered reports of newly established programmes till now<sup>[51,184-187]</sup>. However, there are a few notable exceptions. There are two reports from Hong Kong describing the provision of telepsychiatric services to elderly psychiatric patients<sup>[60,188]</sup>, one of which is a RCT of a cognitive intervention in community-dwelling elderly with dementia<sup>[60]</sup>. There are several reports from an ongoing telepsychiatric programme in the University of KwaZulu-Natal in South Africa<sup>[2,15,185]</sup>. This group has undertaken systematic reviews of the effectiveness of videoconferencing, developed a model for such a service, and adapted guidelines for its use. Another review of studies from the Middle-East located 11 studies, two of which were RCTs<sup>[189]</sup>. From India there are reports from two ongoing videoconferencing-based projects. The Schizophrenia Research Foundation at Chennai in the south began experimenting with telepsychiatry in 2005, as part of its psychosocial intervention programmes for Tsunami victims<sup>[190,191]</sup>. From 2010 they have been running a mobile telepsychiatry service covering 156 villages. Over 1200 patients with severe mental illness have been treated by this facility. The telepsychiatry programme at the Department of Psychiatry, Postgraduate Institute of

Medical Education and Research (PGIMER), Chandigarh, India, developed in joint collaboration with the Department of Science and Technology, Government of India and the Tata Consultancy Services has also been running for over four years now<sup>[22,192]</sup>. The nodal centre of this service is at PGIMER, while the three remote sites are in the adjoining hill states of north-India. This programme has several innovative features. Established telepsychiatric programmes usually follow one of the several different models of care, such as direct patient management through video-conferencing, consultation models, or collaborative-care models<sup>[14,108]</sup>. However, such models may be difficult to implement in countries like India with severe manpower and resource limitations<sup>[22,192]</sup>. Therefore, right from the onset, the programme at PGIMER has followed a somewhat different model of training and enabling non-specialist personnel at remote sites to diagnose and treat mental illnesses on their own, with minimal consultation, supervision, or direct care from the nodal centre<sup>[193]</sup>. To this end, a logically-linked computerized decision support system (CDSS) for diagnosis and management of common psychiatric disorders in adults, and in children and adolescents, has been developed as a part of this project. Computerized decision support systems provide clinicians and/or patients with intelligently filtered information at appropriate times to enhance patient care<sup>[194]</sup>. They are generally used to reduce errors in drug prescribing and providing information on best practices for managing patients. A systematic review found that though data on patient outcomes is limited, such systems may enhance preventive care and guideline adherence, particularly when they are effectively integrated into clinical workflows<sup>[194]</sup>. In the novel telepsychiatry application developed by the PGIMER, the CDSS has been used not only to provide standardized ways of diagnosing and managing psychiatric disorders, but also to effectively link the modules of diagnosis, treatment and follow-up care. The diagnostic module has screening and criteria-based diagnostic sub-modules, which enables the user to generate a diagnosis independently. Based on the diagnosis generated, standardized pharmacological and non-pharmacological treatment can be offered and follow-up undertaken. Training in the use of the application is conducted entirely online, following which a non-specialist health professional can diagnose and treat common psychiatric disorders with minimal supervision from psychiatrists at the nodal centre. Preliminary results regarding accuracy and reliability of the diagnoses generated compared to standardized interviews, and the usefulness of treatment modules has been encouraging<sup>[193,195,196]</sup>.

## CONCLUSION

Is telepsychiatry an idea whose time has come? There is no doubt videoconferencing-based telepsychiatry facilitates effective service-provision in a large number of

areas, where access to high-quality services is difficult. Consequently, it promotes an equality of access, a sense of empowerment among patients, and high levels of satisfaction among them. The evidence to date is highly suggestive that it is comparable to face-to-face care on several aspects of what is traditionally considered effectiveness. However, by the present stringent standards, the quality of the evidence is, perhaps, not adequate. Additionally, there are several barriers to telepsychiatry's wider implementation such as cost-effectiveness, uncertain ethical and legal implications, and concerns about sustainability of programmes. These continue to thwart its integration into the routine network of mental health services. Accordingly, at present telepsychiatric services can only serve as an adjunct to the more traditional modes of service-delivery, but can never replace them. Therefore, the way forward would be to develop hybrid models, which incorporate both forms of service-delivery<sup>[84,172]</sup>. If telepsychiatry settles into this niche, it has the potential to enhance the overall efficiency of mental health services by removing the many obstacles, which afflict conventional systems of service-delivery. This model may also work for low- and middle-income countries, provided that effective, needs-based forms of telepsychiatric services are developed in these countries as well.

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