A Review of Models and Efficacy of Telepsychiatry for Inpatient Service Delivery: Proposing a Model for Indian Settings

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ABSTRACT

Background: The use of telepsychiatry (TP) for inpatient service delivery is still an emerging field and there is limited literature on its practice and evidence. This review was conducted with the objectives of (a) exploring the models of TP for inpatient service delivery, (b) qualitative synthesis of the efficacy of TP in inpatient settings, and (c) proposing a best-fit model of TP-based inpatient care for Indian settings.

Methods: An electronic database search was conducted on July 22, 2020, in PubMed, Directory of Open Access Journals, and Google Scholar for relevant articles. Seventeen articles were included in the review.

Results: The review revealed three models for TP-based inpatient care; direct care model, teleconsultation model, and the collaborative care model. Preliminary evidence suggests that TP is cost-effective and reliable, and that patients and service providers are highly satisfied with this approach. Evidence gaps were seen for some diagnostic categories such as psychosis and for extremes of age groups. Based on the existing models, we propose an Indian model for implementing TP in inpatient settings.

Conclusion: Promising initial results and the evidence gaps highlight the need for further research in this area.

Keywords: Distance education/telecommunication, health services research, literature reviews, telemedicine/telecare

Key Messages: Telepsychiatry services can be provided to remote rural hospitals and medico-surgical wards. The direct care model can also substitute temporary absence of psychiatrist. Telepsychiatry-based inpatient care is cost-effective and reliable.

The National Library of Medicine has defined telemedicine as the use of electronic communication and information technologies to provide or support clinical care at a distance.[1] The WHO's definition includes preventive services and research as well.[2] Telemedicine, when applied to psychiatric care, is telepsychiatry (TP). TP can be synchronous (consisting of live, two-way interactive communication between patient and provider at distant locations) or asynchronous (involving storing of clinical information in multiple formats such as audio, video, email, or web applications for later access by patient and provider). None of these definitions or modalities specify the treatment settings.

Nevertheless, TP has been extensively practiced and researched in the context of outpatient care.[3,4] The scarcity of available literature regarding inpatient TP care is evident in reviews and meta-analysis. For example, a recent review paper on TP outcomes included 134 articles, of which only two focused on the inpatient delivery of TP services.[5] Inpatient TP care could significantly expand the scope of TP. The use of TP in inpatient settings has become particularly relevant during the COVID-19 pandemic. In this article, we reviewed the available literature regarding TP services in inpatient settings. The objectives of the review are to (a) conduct a qualitative exploration of TP models implemented in inpatient settings, (b) provide a qualitative synthesis of the efficacy of TP in inpatient settings, and (c) propose a best-fit model for TP-based inpatient care in the Indian context.

Search Strategy

Using the following search words: telepsychiatry OR "telepsychiatry" OR "videoconferencing" OR "Telemental health" OR "Tele-mental health" OR "Videoconferencing" AND "Psychiatry" OR "Mental health" AND "Inpatient," we carried out an electronic database search on July 22, 2020, in PubMed, Directory of Open Access Journals (DOAJ), and Google Scholar (without including any limitations on time). This retrieved 28 articles in total, out of which 11 were excluded given that 10 of these dealt with "inpatient care planning" or "alternatives of inpatient care" or "reduction in number of inpatient cases" or "nursing home residents," and one article was not available. No meta-analysis or reviews were found specifically addressing TP service in inpatient settings.

Models of Telepsychiatry for Inpatient Care

TP models for outpatient and community populations have been adapted for inpatient service delivery. These models can be, specifically, categorized as follows: direct care model, teleconsultation, and collaborative/integrated care. Most of these models involve multidisciplinary team-based care. In a few of the studies, these models have been coupled with a "stepped-care approach." The target populations are patients admitted in rural psychiatry hospitals, psychiatry units for special populations, consultation–liaison (CL) with medical or surgical units, and in an emergency area waiting for admission to inpatient care.[6–23]

Collaborative Care Model (CCM)/Integrated Care Model

This model is the most commonly used and studied regarding TP service delivery in inpatient settings. This model follows a patient-centered approach where the TP provider collaborates with the primary care provider by supervising the onsite service provider regularly (daily

to weekly rounds). This model relies on a dedicated onsite "care manager." The care manager is a mental health professional with additional training in TP who administers screening tools, coordinates with primary care providers and TP providers, and also ensures adequate treatment adherence.

Several notable features and modifications of the CCM have been adopted in studies examining the use of TP in inpatient settings. These include (a) stepped-care, which involves referring patients with complex needs to tertiary care centers, where the onsite psychiatrist is available; (b) hub and spokes, which consists of a center with telepsychiatrists (hub) providing services to multiple centers (spokes); and (c) multidisciplinary, which involves a team of dedicated professionals at the center receiving TP services.

TP services provided to a geropsychiatric unit operated under a multidisciplinary team (program director, registered nurses, licensed clinical social workers, nurses, certified nurse aides, activities coordinator, and a physician's assistant)[6] is an example for the CCM model. Here, the registered nurse was the point of contact for daily psychiatric rounds through telemedicine, and she did a physical examination of patients, recorded orders, and noted medication changes.[6] In another setting for detained patients (a medical center with no psychiatric unit), TP used the CCM model—the resource person here, however, was a mental health professional (social workers or psychologists). TP consultations were arranged after the patients were "boarding" on the medical wards rather than for initial evaluation.[7] In the CCM model, the overall decision-making is in the hands of primary care providers at the spokes, working in liaison and supervision with the telepsychiatrist.

Teleconsultation Model

This model has been used to provide CL services using TP for patients admitted in medical/surgical units. In this model, the TP provider is a CL physician working at a specialized center, and the medical/surgical unit requesting consultation may comprise one or more mental health professionals (trained nurse or psychologist) and the primary care provider. The initial evaluation is done by the telepsychiatrist, with or without the support from onsite mental health professionals. The TP provider consults with the primary care provider regarding ongoing treatment, and treatment recommendations are given to the primary care provider. The TP provider does not deliver ongoing care, instead assists the primary care provider. Treatment decisions are those of the primary treating team, in contrast to the CCM above, where the decisions are made jointly. Merits of this model include higher utilization of resources, easy accessibility, and opportunity to strengthen the skills of primary care providers for caring for mental health issues in their patients.

TP provided by a university medical center to a small academic hospital that did not have its own onsite CL psychiatry team is an example of this model.[8] A resource nurse at the center receiving TP service operated the telemedicine cart and maintained records. In another university setting providing TP to peripheral hospitals, a psychologist was available as part of the primary medical/surgical team at the periphery, who did the initial assessment. [9]

Direct Care Model

This model involves a telepsychiatrist from a specialized center seeing patients admitted at another distant center for situations where the local psychiatrist is not available due to any reason (vacations, personal emergency, etc.). In this model, the telepsychiatrist does the initial evaluation using videoconferencing and is responsible for ongoing sessions and treatment recommendations. The telepsychiatrist may coordinate care with primary care providers, but TP providers hold primary responsibility for the care of patients. The model has the advantages of easy accessibility, ensuring continuity of care, and higher quality of care, but falls short on comprehensive and collaborative care. Since the burden of care is entirely on the TP provider, it does not meet the aim of increasing the number of patients seen via TP.[10]

Essential illustrations of these models appear in **Figures 1–3**.

Evidence for Inpatient Telepsychiatry (TP)

The available literature on TP in inpatient settings comes from high-income countries such as the United States, Australia, and countries from the European Union such as Finland. Studies compared either face-to-face with the TP consultations or were intended to show the effect of TP in a pre-post design. Outcomes were focused on effectiveness, cost-effectiveness, satisfaction, and reliability.

Effectiveness and Cost-Effectiveness of TP

The effectiveness of TP across studies was evaluated by examining clinical outcomes. A study from Australia showed that TP could be an effective medium for patients admitted with psychosis. This TP service was a direct care model. The reduction of symptoms on the brief psychiatric rating scale preadmission and discharge were significant in the TP group.[11] Another study from the USA assessed treatment effectiveness with a patient self-assessment survey and staff's assessment of clinical outcomes. They found that direct care TP, as a model of service delivery, was effective in both patient and staff-rated outcomes. Interestingly, patient-rated development of rapport and effectiveness of treatment were higher than staff ratings.[12] Both of these studies had a prepost design and did not have any comparison group.

When it comes to literature on cost-effectiveness, there were very few studies. Mielonen and colleagues studied the delivery of TP via videoconferencing, which was limited to counseling, therapy, consultations, and teaching at Finland University Hospital.[13] Authors found videoconferencing as a relatively inexpensive method compared to the conventional mode of service delivery. A study from forensic settings also showed that TP was a cost-effective alternative.[14] Although not as a primary outcome, another study from Australia found that TP improved the acceptability of treatment by curbing the travel cost.[15] In D'Souza's study, although satisfaction and improvement of symptoms were primary outcomes, the authors found that re-

FIGURE 1.

Model For Inpatient Telepsychiarty (TP) Delivery in Psychiarty Units: Collaborative Care Model/ Integrated Care Model

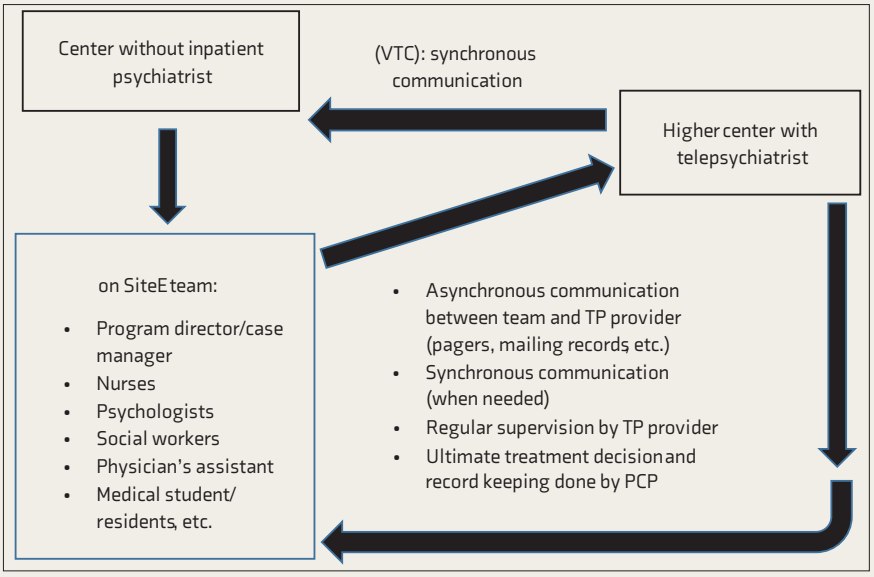

Figure 1 illustrates a model where center receiving TP services has a multidisciplinary team; one member of team is assigned to be "care manager." Physical examination and emergency management is done by on-site team and request for consultation along with communication of case history is done by asynchronous communication. TP provider then assesses patient with collaboration with care manager and addresses the treatment concerns. Regular supervision is ensured by TP provider.

FIGURE 2.

Model for Inpatient Telepsychiatry Delivery in Medical/Surgical Units: Extension of Traditional Consultation–Liaison (CL) Model/ Telemedicine-Based Care Model

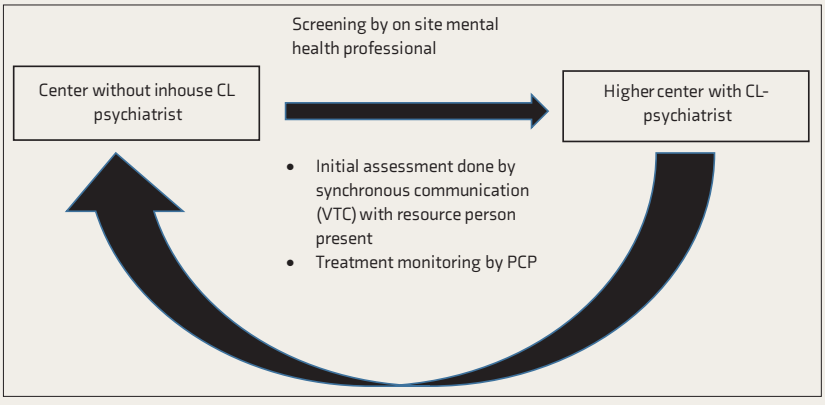

Figure 2 illustrates a model where consultation calls are assessed by an on-site mental health professional and screened for need of TP consultation. TP provider is often contacted by asynchronous communication after which initial assessment is done by the TP provider in the presence of an on-site resource person and treatment recommendations are made. Primary care provider (PCP) remains in-charge of all treatment decisions.

Abbreviations. CL: consultation–liaison, PCP: primary care physician.

duction in travel costs was a significant factor for acceptance by service users of treatment via TP.[11]

Reliability

Several authors have assessed for the reliability of TP vis-a-vis conventional face-to-face treatment. Reliability was evaluated by comparing the scores of assessment and the diagnoses made by at least two raters—either both done using TP or one rater using conventional methods of assessment.[16] In a study from Australia conducted over 14 months in a psychiatric inpatient unit, specialist psychiatrists interviewed subjects using a semistructured interview alternating interviewer and observer configuration. Diagnoses and ratings were recorded at the end of the interview. The main instrument used was the brief psychiatric rating scale. This study compared the agreement between the observer and interviewer. The authors concluded that diagnosis was reliably made using TP.[17] Another study that focused on inpatients with depression also found that TP could be reliably used to assess patients with the Hamilton depression scale.[18] Furthermore, a recent study conducted in an inpatient department of a university-affiliated hospital in Iran evaluated the diagnostic agreement between TP assessment and face-to-face assessment and revealed that the diagnostic agreement between the two interviewers was 75%.[19]

Satisfaction

The majority of studies summarized "patients" responses to quantitative self-report questionnaires with descriptive statistics for assessing satisfaction. A study from Finland found that TP had high patient satisfaction when evaluated on a self-report questionnaire (80% considered it to have been useful).[15] Another study assessed satisfaction on a five-point Likert scale and found TP to have high patient satisfaction. However, the authors found that patients admitted with psychosis reported more difficulty hearing the doctor than patients without psychosis. Patients incorporated virtual teleconferencing into delusions, which may seem to make TP an unfavorable mode for treatment for patients with acute psychosis, who require inpatient care.[12] Another study from California used a direct care model for two days, and "patients" feedback was collected after every session. Patients expressed a positive experience with telehealth and no preference for in-person care; moreover, all patients seen by the tele-provider preferred the TP approach. Other studies, too, showed high patient satisfaction for TP in inpatient care.[7,11,17–20] All studies are summarized in **Table 1**.

TP in Different Age Groups

Most of the studies have assessed inpatient TP in general adult patients, and

FIGURE 3.

Direct Care Model

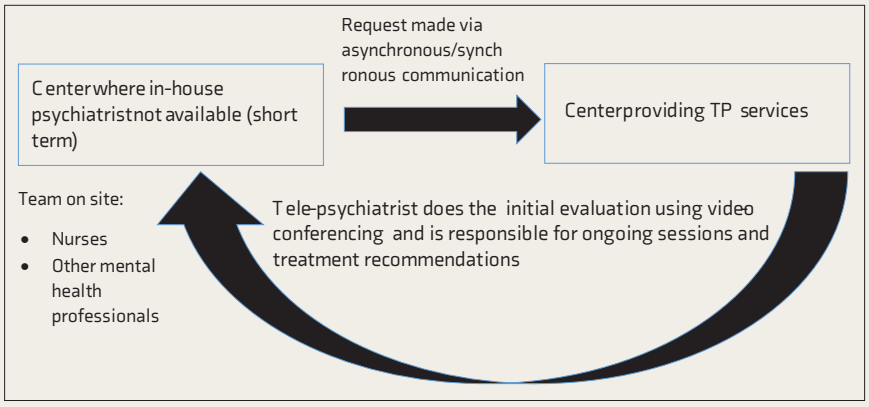

Figure 3 illustrates a direct care model which has been used in situations where an inhouse psychiatrist was not available for service delivery for a short period of time. In this model, the on-site team, often consisting of residents or medical students do initial physical assessment and ensure patient's safety, following which request is made for TP consultation. TP provider does the initial evaluation and is responsible for ongoing treatment recommendations along with training and supervision of the on-site staff.

there were only a handful of studies in extremes of age groups. Studies have evaluated this model of service delivery in geriatric patients residing in nursing homes and have found TP to be reliable after comparing assessment scores to in-person assessment.[21–23] One study from Oklahoma assessed the use of TP in an inpatient geropsychiatric unit at an under-served facility using a multidisciplinary treatment team model. The authors analyzed patient and family satisfaction survey data for a period ranging to 12 months before the inception of telemedicine and 12 months after inception. Results showed a positive correlation between telemedicine and patient/family satisfaction.[6] Studies for inpatient TP delivery for children and adolescents are still lacking.

Opportunities and Proposed Model for Inpatient Telepsychiatry in India

With over 560 million Internet users, India is the second-largest online market in the world, ranked only behind China. By 2023, there will be over 650 million Internet users in the country.[24] India has a predominantly rural population, constituting around 72% of the total. In 2019, rural users outnumbered urban Internet users by 10%, thereby progressively narrowing the digital divide that had existed earlier.[24] A huge opportunity lies in using TP as a primary mode of service delivery in remote areas, where specialist psychiatry services are not available. The availability of psychiatrists (per lakh population) as found in the National Mental Health Survey states varied from 0.05 in Madhya Pradesh to 1.2 in Kerala, with most states even falling short of the requirement of at least one psychiatrist per lakh population.[25] The availability of psychiatric social workers, psychologists, and psychiatric nurses was more sobering. The limited availability of specialist mental health human resources has been

TABLE 1.

Summary of the Evidence of Telepsychiatry-Based Service Delivery for Inpatient Care (*N* = 17 Studies)

Author & Year	Setting and Population Studied	Mode of Telepsychiatry Used	Model	Outcome Assessed	Result/Comments
Baigent et al., 1997	Adult state hospital inpatients	Videoconferencing	Compared face to face interviews with video consultations	Reliability and satisfaction	Reliability: BPRS ratings similar, though difficulty with "overall concern" and affect. Many patients were satisfied and preferred it instead of in-person
Ball et al., 1997	Adult inpatients	Videoconferencing	Only tele-assessment	Satisfaction	Good satisfaction compared with in-person, telephone, and hands-free telephone
Montani et al., 1997	Geriatric inpatients	Videoconferencing	Psychometric evaluation of face to face versus tele-assessment	Reliability of psychometric tests	Small differences in mean scores between video and face-to-face administration
Mielonen et al., 1998	Adult inpatients	Videoconferencing	Direct care model	Satisfaction and costs	High patient satisfaction (80% considered it to have been useful). Savings in health care costs, reduction in travel, and ease and speed of consultation
Alessi et al., 1999	Adult forensic inpatients	Videoconferencing	Direct care model	Cost-effectiveness	Telepsychiatry is cost-effective
Ruskin, 2000	Adult inpatients with depression	Videoconferencing	Direct care model	Reliability	Reliability coefficients similar for in-person and telepsychiatry
D'Souza, 2000	Acute Psychiatric inpatients from 15 rural hospitals	Videoconferencing	Direct care model	Satisfaction and treatment outcome	Significant improvement in the mean total BPRS scores from initial assessment to follow-up with good inter-rater reliability. Reduction in travel costs with high patient satisfaction

Menon et al., 2001	Elderly patients admitted to the acute medical unit or the geriatric evaluation and management unit of a veterans affairs medical center	Videoconferencing	Direct care model	Reliability (scores of assessment)	Remote assessment of depression and of cognitive status was comparable to in-person assessment
Jones et al., 2001	Geriatric psychiatry inpatients	Videoconferencing	Psychometric evaluation of face-to-face versus tele-assessment	Reliability for diagnosing depression	Good agreement between a face-to-face observer and the telemedicine interviewer
Holden & Dew, 2008	Community-based inpatient setting (gero-psychiatric unit)	Videoconferencing	Collaborative care model	Patient/family satisfaction 12 months prior to inception of telemedicine and 12 months post that	Positive correlation was found between telemedicine and patient/family satisfaction with perception of benefit from treatment
Grady et al., 2011	Rural inpatient psychiatric unit	Teleconferencing (VTC)	Direct care model	Psychiatrist's efficiency and consistency	Patients with psychosis reported more difficulty hearing the doctor than without psychosis. Patients rated development of rapport and effectiveness of treatment higher than staff ratings. Telepsychiatry services were more effective with higher functioning patients.
Devido et al., 2015	Psychiatric inpatients in a general hospital	Videoconferencing	Teleconsultation model	Asses model of inpatient consultation–liaison psychiatry services	Telemedicine is a viable model for inpatient consultation–liaison psychiatry services to hospitals without onsite psychiatry resources and represents a viable alternative model of service delivery
Graziane et al., 2017	Psychiatric inpatients in a general	Videoconferencing	Teleconsultation model	Common consultation questions, patterns of diagnosis, and recommendations	Most common diagnosis was delirium followed by dementia. Investigations were recommended and medications were started or changed
Evangelatos et al., 2018	Case series involving 12 inpatients (24 visits)	Videoconferencing	Direct care model		No differences between telehealth and non-telehealth patients in use of emergency medications, codes, and length of stay. Patients expressed positive experience with telehealth and no preference for in-person care; high preference for TP for maintaining continuity
Kimmel &Toor, 2018	Initial and follow-up consults of inpatients in medical ward	Videoconferencing and phone calls	Collaborative care model	To develop the first US program covering the consult service to patients in the medical wards of unaffiliated, rural hospitals	Benefits noted by consultants, patients, and community hospital medical staff
Kimmel et al., 2019	Inpatient and outpatient services in a critical access hospital	Videoconferencing	Collaborative care model	To develop service delivery model	Telepsychiatry was useful for supporting inpatient care at critical access hospital by regular access to psychiatrists
Mazhari et al., 2019	Adult inpatients	Videoconferencing	Compared face-to-face interviews with video consultations	Reliability (diagnostic agreement) and satisfaction	Diagnostic agreement between the two interviewers was 75% and was acceptable by majority of patients

Abbreviation. BPRS: Brief Psychiatric Rating Scale.

one of the barriers in providing essential mental health care to all. Limited availability contributed to the treatment gap of around 85% for mental disorders. The use of TP could expand access to a larger, difficult-to-reach population. TP may also provide training opportunities for health care staff working in inpatient wards to address the basic mental health needs of their patients.

All of the models we reviewed were developed and studied predominantly in a Western context. Thus, given the differences in infrastructure and human resource capacity, these models need to be adapted for consideration in the Indian setting. Therefore, we propose a model for inpatient TP delivery in an Indian setting, as illustrated in **Figure 4**. The model would be based on the CCM working on the principles of the "hub and spokes" model. The hubs could be tertiary care centers like government medical colleges with psychiatrists, which would deliver TP services to one or more spokes such as community health care centers and district hospitals (where psychiatrists are not available for inpatient care). This model would require building infrastructure, including installation of delivery systems, ensuring adequate internet connectivity. The peripheral centers would need to have a team dedicated for TP, preferably multidisciplinary comprising (a) one medical officer, (b) a nurse for clinical assessment and day-to-day clinical care, (c) technician with training in operating and smooth functioning of the delivery system, and (d) other mental health professional staff such as psychologists and social workers. However, the existing pool of human resources in the country might not always allow such a resource-intensive plan. Hence, the system should be flexible in accordance with localized contexts. The "hub" will involve in the capacity building of the existing human resources.

An induction and experiential training would be required for all the staff at the remote sites. Having adequate technical infrastructure and training have been documented as necessary requisites for optimizing the successful implementation of TP.[3] The TP service provider and centers receiving services should aim to build a proper working and professional relationship.

The primary team of medical professionals would initially assess admitted patients. TP providers could have access to the clinical assessments and medical records of admitted patients through asynchronous communication so that they could review it before the scheduled videoconferencing-based inpatient rounds. The "hub" could hold regular rounds with each center; the frequency could be dictated by the case-load of the particular remote site. The TP providers would plan the ongoing treatment in collaboration with the primary team. The care managers would be responsible for its timely implementation, and the nursing professionals would carry it out at the ground level. Teams of all the remote sites could attend rounds to encourage vicarious learning and discussion, and ongoing training and capacity building should be supported.

Challenges for Inpatient TP Model in Indian Setting

There could be structural, systemic, and attitudinal barriers to implement this model.[3,4] Lack of existing infrastructure and problems with internet bandwidth are structural barriers. There is a shortage of mental health professionals. And there is limited experience with TP (or telemedicine in general) for existing professionals. These can act as systemic barriers. There is also a lack of governance for developing TP initiatives. The legal aspect of TP remains another roadblock. Other challenges include issues of feasibility and concerns of the medical staff regarding providing treatment via TP to certain types of populations like patients with psychotic illnesses. The problems of privacy, the possibility of stigmatizing, and marginalizing by the health care system also may interfere.[3] Research also shows that patients may also have concerns about TP, such as loss of human contact, limited technological competencies or skills, concerns about privacy, quality of audio and video transmission, and reliability of videoconferencing for diagnostic assessment. Therefore , concerns of patients about TP require further consideration.[26] It is important to note that telemedicine guidelines focus on outpatient care, and health insurance may cover out-patient-based telemedicine consultations only.

FIGURE 4.

Proposed Model for Inpatient Telepsychiatry Delivery in India (Public Sector)

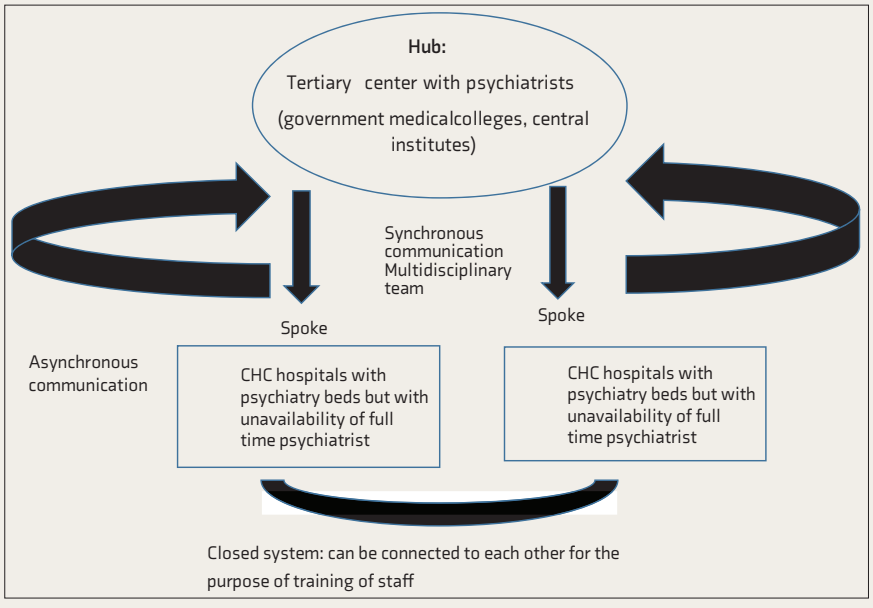

Figure 4 illustrates the proposed model where tertiary centers would provide TP services to one or more peripheral centers. The peripheral centers would have an onsite team, including one trained care manager. Care manager would request appointments, send medical records and relevant physical findings using asynchronous communication and then higher centers would use synchronous communication to assess patient in presence of care manager and discuss treatment plan. Regular supervision would be ensured. Multiple attached centers will have provision to attend rounds for the purpose of learning.

Abbreviation: CHC, Community health center

Conclusion

TP is an evolving field that shows great potential to address the mental health needs of a large number of people who otherwise do not have access to mental health services. The available literature, in the context of inpatient settings, has shown TP to be a widely accepted, cost-effective, reliable, and effective mode of treatment. This mode of service delivery warrants further research and consideration for Indian inpatient psychiatric settings.

Declaration of Conflicting Interests

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