

TELEPSYCHIATRY IN INTEGRATED CARE: A RETROSPECTIVE COMPARATIVE STUDY FROM UTTAR PRADESH

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ABSTRACT

BACKGROUND

Lack of affordable and accessible mental health care is a major contributor to a huge burden of mental health disorders in India. Integrating mental health into primary care is a model proposed to address this treatment gap. Tele-psychiatry can be a cost-effective modality to achieve the goal of integration.

AIM

We compare the efficacy of 'Integrated Tele-Mental Health' with that of face-to-face interventions through Mobile Medical Units (MMU). We then compare the outcomes of physicians of various levels of expertise in mental health care.

MATERIAL AND METHOD

A retrospective analysis was done on 6 months data recorded from 5 villages where face-to-face and tele-medicine unit (TMU) services were being provided. Patients were grouped based on physician, site of services, and diagnostic category.

RESULT

3760 patients were enrolled, of which 139 had Common Mental Disorders (CMD), and 61 had Severe Mental Disorders (SMD). There was no difference between the TMU doctors (Psychiatrist and Physicians trained in mental health) when it came to detect mental illnesses. The TMU had a better detection rate of CMDs and lower detection rate of SMD. Patients had a higher mean duration of follow-up at the MMU. SMD detection was higher in villages where pre-existing community interventions were in place.

CONCLUSION

The use of integrated tele-mental health is an effective model in reducing the treatment gap and empowering the primary care physicians in delivering mental health care. With adequate training, physicians can be at par with mental health professionals for screening for mental health disorders. Given the scalable nature of the technology, there are enormous potential in its usage to address the lack of accessible mental health care.

INTRODUCTION

India and the other Low- and Middle- Income countries have a huge burden of mental health disorders and a wide treatment gap. Lack of affordable and accessible mental health care is one of the major factors contributing

to this¹. Integration of mental health with existing primary health care services is one of the models proposed to reduce the treatment gap in an economical manner in such countries²⁻⁴. In this model, the community health worker is trained to identify persons with mental illness, and the primary health physician is trained to diagnose and treat these patients. Besides training, effective outcomes in this approach depend upon continuing support and supervision by mental health professionals.⁵

Ramakrishna Mission, Varanasi (RKM) has been delivering community-based primary health care services through Mobile Medical Units (MMU) in nine villages clusters in Uttar Pradesh since 2006. In 2013, mental health services were integrated into this health program. Primary health and mental health services based on this integrated care model continues to be delivered on a sustained basis till date.⁶

Tele-medicine Units (TMU), with integrated telepsychiatry, was added to this ongoing program in June 2018. Thus, the services delivered through the TMU grew from, and mirror, the ongoing community-based integrated care service. At both the MMU and TMU, mental health care is delivered by non-specialist physicians trained in mental health. Mental health care is integrated into the primary health clinic; there is no separate psychiatry clinic.

In this paper, we present data on patients with mental health disorders treated at 5 villages where integrated services are being provided through TMU and MMU. This data covers a 6 months period starting from October 2018.

DESCRIPTION OF THE PROGRAM

Four of the five TMUs were initiated in June 2018 within villages where the MMU services were ongoing from 2013. The fifth site was at Azamgarh, a site where RKM was running a school, but not delivering any health care services before this. Here, both the TMU and MMU were initiated in December 2018. The earlier system of once-a-week visits by the MMU continues alongside the TMU.

Each TMU is a combined residence and clinic. Two team members reside there for 4 days a week. These team members are trained in delivering community based primary health and mental health services as physician substitutes.⁶ Every day, the team conducts the telemedicine clinic with the remote location physician for 2-4 hours. For the rest of the day, the team is in the field to deliver the community-based interventions. The embedded nature of the team within the community allows for this tele-consultation to be seamlessly integrated with broader interventions that require a presence on the ground. These interventions include screening, early detection, ensuring treatment adherence, and preventive and educational inputs, for both general and mental health conditions.

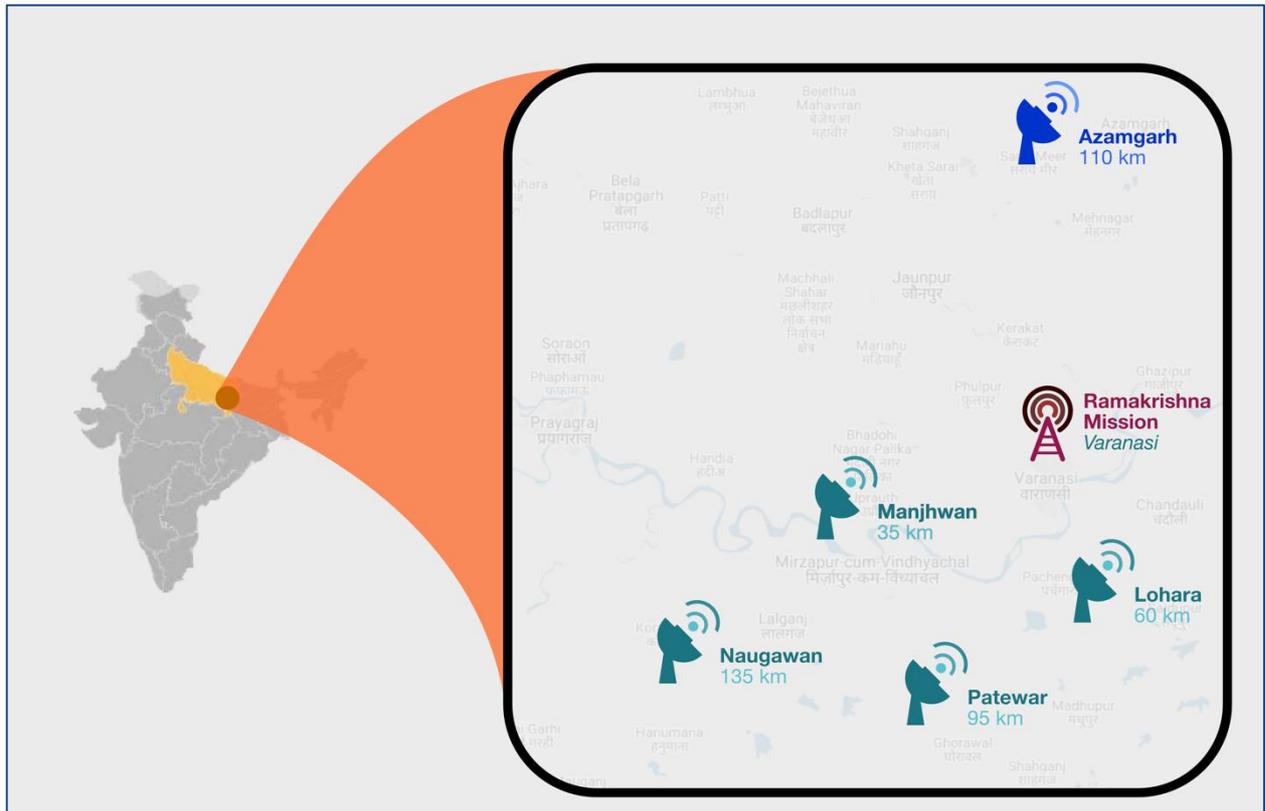


Figure 1: Map showing all the TMU sites. Azamgarh, an index site for community-based intervention, is displayed in a different color.

PHYSICIAN CHARACTERISTICS

There are two MMU physicians who travel between the 5 sites. Both the MMU physicians, HP and AS, are trained and experienced in diagnosing and treating mental health conditions in this setting and have been part of the integrated health services from its inception. At the TMU, SV, a pediatrician by training, has extensive experience in community mental health. All these three physicians are ‘non-specialist physicians trained in mental health’, a category for whom we will use the term **MH-physician**.

AB is a psychiatrist who has been involved in the training and supervision of the team since mental health was integrated into the primary health services in 2013. After the inception of the TMU, he took additional charge as a primary care physician at the TMU.

DIAGNOSIS AND TREATMENT

Persons identified as having a mental disorder were classified by the physician into the Common Mental Disorder (CMD) or Severe Mental Disorder (SMD) categories. CMD refers to depression (excluding severe depression with psychotic features), anxiety, and mixed anxiety and depression. SMD refers to schizophrenia, bipolar disorders and other psychoses. Substance abuse disorders were not included.

Coexisting medical problems were also diagnosed and treated. Medicines were provided free of cost by Ramakrishna Mission. Psychosocial interventions were provided during the patients’ visit to the TMU/MMU and also within the community during the teams’ field visits.

TECHNICAL SPECIFICATIONS

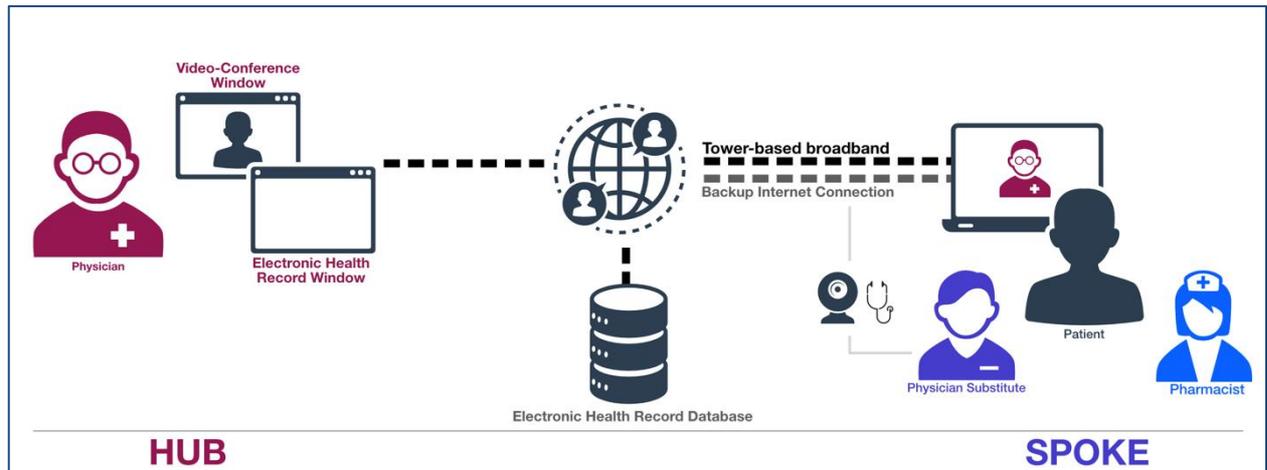


Figure 2: Model of the TMU

Tele-medicine services were setup with assistance from TATA Trust, developed by GloHeal, consisting of a two-way teleconferencing system. A physician sits at one end of the system (referred to as a hub) and logs in to the physician portal and is greeted by a list of patients registered for that day. The patients are at one of the sites of the TMU (referred to as spoke), where an operator enters the demographic details such as name, age, sex, village and calls in the patients for a real time tele-consultation. Patient data was recorded in a web-based SQL database (SAMHITA), that was hosted on a server maintained by MicroFinancial Software Development. The database was run on a Linux based system and is accessible online using an HTML web browser. Technical support for database and video conferencing software was provided over telephone by the provider companies. **a hub and spoke model**

On the doctor's end, is a computer system with the physician version of the GloHeal software (<http://www.gloheal.com>) to see and hear the patient in real time, and options to access the inputs from the digital USB stethoscope and examination camera.

On the patient end, is a 32" LCD screen attached to a computer system running the GloHeal software, on which the patient was able to see a live video feed of the physician. A Full HD webcam with far-field microphones was used to capture patient audio and video. Additionally, a hand-held wide-angle camera was used for general close-up examination. A digital stethoscope was in place for recording heart sounds.

Internet access was provided using a primary link via tower broadband provided by SiFy (<https://www.sifytechnologies.com/network-services/telecom-data-network/>) with an average link speed of 5 Mbps, which was adequate for synchronous consultations. Backup link was provided using VoLTE based internet connection on the Reliance Jio network, with an average link speed of 4 Mbps.

ETHICS

The JMSP was primarily designed as an implementation program and, as per the ICMR guidelines at the time of initiation in 2013, unlike for clinical trials, there was no requirement for formal ethics clearance.

However, all aspects of the routine data collection and the written informed consent procedures were made available to the Program Advisory Committee who reviewed the information sheets, consent form and procedures and provided clearance for data collection. This paper reflects collated process indicators and not individual level data.

KEYWORDS

Telepsychiatry, Integrated Care, Mental Health, Primary health, India

ABBREVIATIONS

RKM – Ramakrishna Mission

MMU – Mobile Medicine Unit

TMU – Tele-Medicine Unit

MH-Physician – non-specialist physician trained in Mental Health

CMD – Common Mental Disorders

SMD – Severe Mental Disorders

VC – Video Conference

F2F – Face to Face

TELEPSYCHIATRY IN INDIA

The emergence of telemedicine and telepsychiatry has significantly expanded the ways in which health services can be imagined and delivered. In India, several telepsychiatry programs have been implemented. SCARF, Chennai is providing telepsychiatry services through peripheral units in several districts in Tamil Nadu.⁷ It is also running mobile telepsychiatry clinics in conjunction with laypersons trained in mental health in remote villages in Pudukottai District, Tamil Nadu.^{7,8} NIMHANS, Bengaluru provides telepsychiatry services to all District Hospitals in Karnataka.⁹ PGIMER, Chandigarh has developed a Clinical Decision Support System for the diagnosis and management of psychiatric disorders by non-specialists. This system is 'tele-enabled' by providing for training, supervision and assistance in difficult cases with the nodal centre.¹⁰ At JSS Bilaspur, this service is delivered by a psychiatrist based in Germany. He visits the community periodically for team training and patient follow up.⁸

Chakrabarti et al in their critical evaluation have noted that videoconferencing (VC) has similar outcomes as compared to face-to-face (F2F) interactions across age groups, diverse demographic profiles and multiple outcome measures¹¹. Specifically, for depressive disorder the outcomes were comparable. In cases of anxiety disorder and schizophrenia, the outcomes were more favorable with VC as compared to F2F.

All these programs are mental health-specific at both ends. At the periphery, the beneficiaries are psychiatric patients, and the person at the hub is a mental health professional. This model can be termed as *conventional telepsychiatry* and can be contrasted with the adaptation of *telepsychiatry with integrated care services*. Neufeld et al reported the findings of 289 patients referred over a 1-year period to a tele-mental health program providing clinical and educational services to 10 rural primary care clinics in California.¹² Waugh et al reported the experience from an urban primary health clinic in Colorado, which had been able to meet the behavioral health needs of the majority of their patients through embedded psychologists. The addition of the virtual psychiatrist helped with the management of patients with more complex physical and behavioral needs.¹³

INTEGRATED CARE AND TELEMEDICINE: 'INTEGRATED TELE-MENTAL HEALTH'

We have seen that, in a low resource setting like those commonly found in India, integrated care is conceptualized as a model where the primary physician is enabled to diagnose and manage uncomplicated psychiatric disorders within the primary health system. It is this model that underlies the integrated primary health services at RKM. The MH-physician provides both primary care and mental health care to all the patients visiting the general health clinic.

Our adaptation of telepsychiatry with integrated care differs from the adaptations described above in two ways. Firstly, the mental health care is delivered by the non-specialist primary care physician rather than by a mental health specialist. Secondly, the beneficiaries are all primary care patients, rather than selected psychiatric patients. Thus, our adaptation remains faithful to the 'Indian' conceptualization of integrated care, while leveraging its reach using technology.

Our program is the only one in the world where mental health services are an inherent component of integrated care that is being delivered through telemedicine by non-specialist physicians in a primary health setting. The term '**Integrated Tele-mental Health**' would be an appropriate description of this model. Its characteristics in comparison to the other models is schematically shown below:

Model	Person providing mental health care at hub	Beneficiary in the periphery
Conventional Telepsychiatry	Mental health specialist	Psychiatric patients
Telepsychiatry adapted with Integrated Care	Mental health specialist	Psychiatric patients selected from primary care patients
Integrated Tele-mental Health	Non-specialist physician, trained in mental health	All primary care patients

AIMS AND OBJECTIVES

Aim

1. To ascertain the efficacy of 'Integrated Tele-mental Health' as compared to face-to-face intervention and compare the outcomes of physicians of various levels of expertise in mental health care.

Objectives

1. To estimate the demographic profile of the patients presenting at the TMU/MMU.
2. To estimate the demographic profile of patients with mental health disorders (CMD/SMD)
3. MH-physician-psychiatrist comparison: In tele-medicine, how do the mental health outcomes when patients are seen by the MH-physician (SV) compare with the outcomes when patients are seen by the psychiatrist (AB), based on detection rates.
4. TMU-MMU comparison: How do the mental health outcomes when patients are seen via tele-medicine by TMU physicians (SV, AB) compare with the outcomes when patients are seen face-to-face by the MMU physicians (HP, AS), based on detection rates.
5. To assess the engagement with integrated telemedicine based on follow up durations.
6. To assess the impact of preceding community mental health program in the village on mental health outcomes, by comparing with a village where there was no preceding program.

METHODOLOGY

The study period was chosen between 1 October 2018 to 31 March 2019 (6 months). In all the five villages, patients with both medical and mental health problems were treated with the doctor-patient interaction being either face-to-face (MMU), or over videoconferencing (TMU).

At the MMU, patients were seen by two MH-physicians, HP and AS. At the TMU, patients were seen by SV, an MH-physician, and by AB, a psychiatrist, here also providing services as a primary care physician in a manner identical to the other three physicians.

The patient data was grouped as follows:

1. Based on presence of mental illness
 - a. Patients diagnosed with mental illness were grouped under CMD/SMD.
 - b. Patients presenting for other illnesses were grouped as 'other'.
2. Based on site of registration, as either TMU or MMU patients.

The villages fall into two categories:

1. In 4 villages, there was an ongoing community mental health program being delivered through the MMU for 4.5 years before TMU was initiated.
2. In one village, there were no such pre-existing program when the TMU and MMU were initiated.

Clinical information was recorded in real time on the SAMHITA database. Data was extracted and analyzed for descriptive statistics using SPSS (version 25.0). Statistical significance for outcomes of physicians was tested using Pearson's Chi Square Test in a 2x2 table, with a confidence interval of 95%.

RESULTS

Table 01: Demographics of presenting patients

	Age	Male		Female		Total
	Mean	n	%	n	%	n
TMU	38	363	37.5%	606	62.5%	969
MMU	38	1142	40.9%	1649	59.1%	2791
Total	38	1505	40.0%	2255	60.0%	3760

A total of 3760 patient were registered within the study period, with 2791 registering with the MMU and 969 with the TMU. Overall a higher percentage of females used the health care services (60%). On comparing the patients presenting to the TMU and MMU, there was no significant difference in terms of gender ($\chi^2(1,3760) = 3.579, p=0.059$) or mean age.

Table 02: Gender Distribution

	Male	Female	Total
CMD	21 15.1%	118 84.9%	139
SMD	39 63.9%	22 36.1%	61
Other	1445 40.6%	2115 59.4%	3560
Total	1505 40.0%	2255 60.0%	3760

CMD patients had a significantly higher number of females as compared to the 'other' patients ($\chi^2(1,3699) = 36.30, p=0.00$). SMD patients showed a significantly higher number of males compared to 'other' patients ($\chi^2(1,3621) = 13.51, p=0.00$).

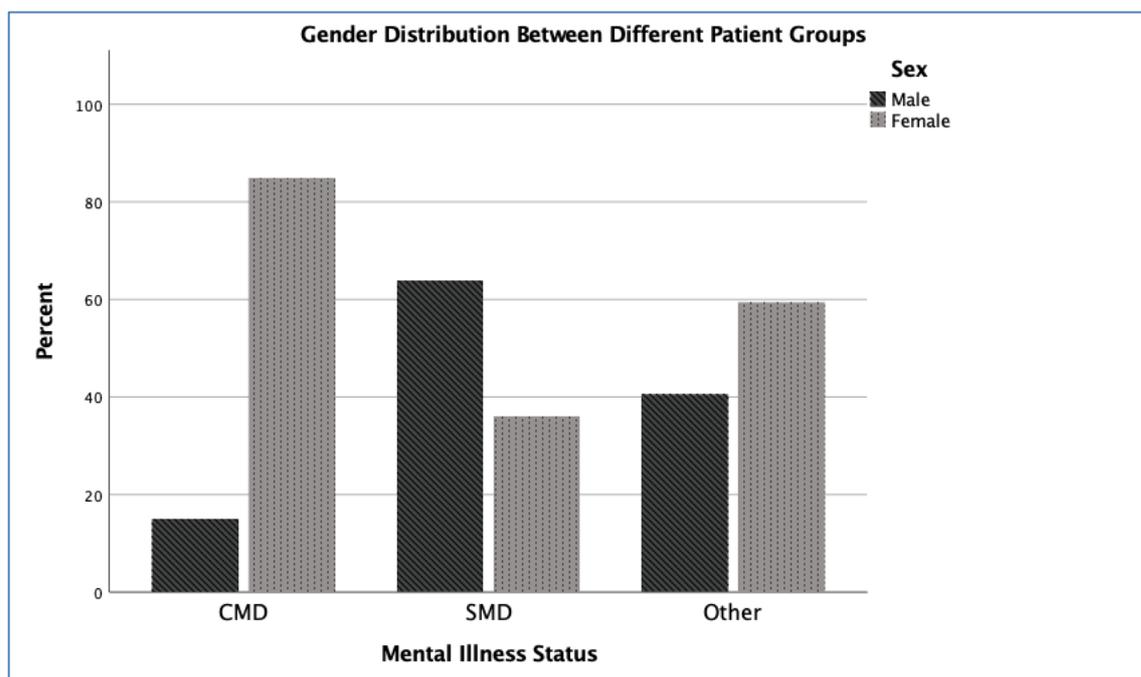


Figure 3: Gender Distribution across patient groups

Table 03: Age Mean

	Age	
	Mean	SD
CMD	46	13
SMD	34	10
Other	38	21
Total	38	21

The mean age of presentation was higher in case of CMD as compared to ‘other’ patients (mean=46), and was marginally lower in the case of SMD patients(mean=34)

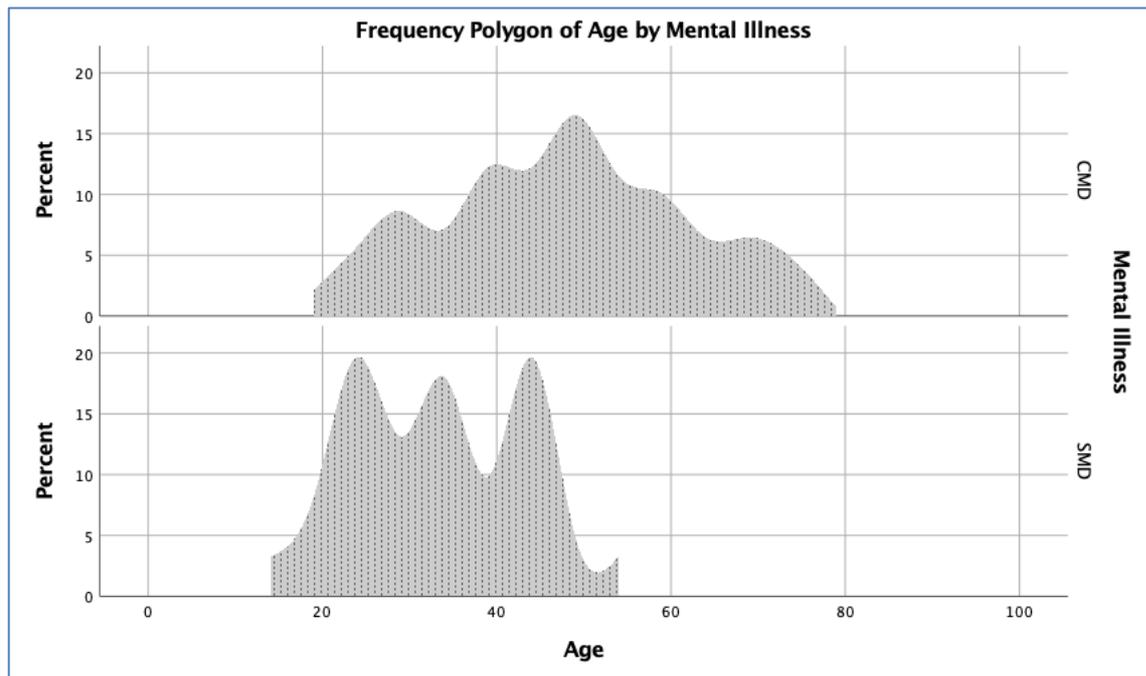


Figure 4: Age distribution across mental illness groups

Table 04: Mental illness detection rates: comparison between the TMU doctors

		CMD	SMD	Total
Dr SV	n	59	1	448
	%	13.2%	0.2%	100.0%
Dr AB	n	50	7	521
	%	9.6%	1.3%	100.0%

When comparing the TMU doctors, there was no significant difference between the detection rates for CMD ($\chi^2(1,969) = 3.08, p=0.079$) or for SMD ($\chi^2(1,969) = 3.69, p=0.055$). In other words, there was no difference between the MH-physician and the psychiatrist on this mental health parameter while treating primary care patients via tele-medicine.

Table 05: Mental illness detection rates: comparison between TMU and MMU

		CMD	SMD	Total
TMU	n	109	8	969
	%	11.2%	0.8%	100.0%
MMU	n	30	53	2791
	%	1.1%	1.9%	100.0%

Between the TMU and MMU, there was a significantly higher detection of CMD at the TMU ($\chi^2(1,3760) = 209.12, p=0.00$). In contrast, for SMD, there was a significantly higher detection at the MMU ($\chi^2(1,3760) = 5.192, p=0.02$).

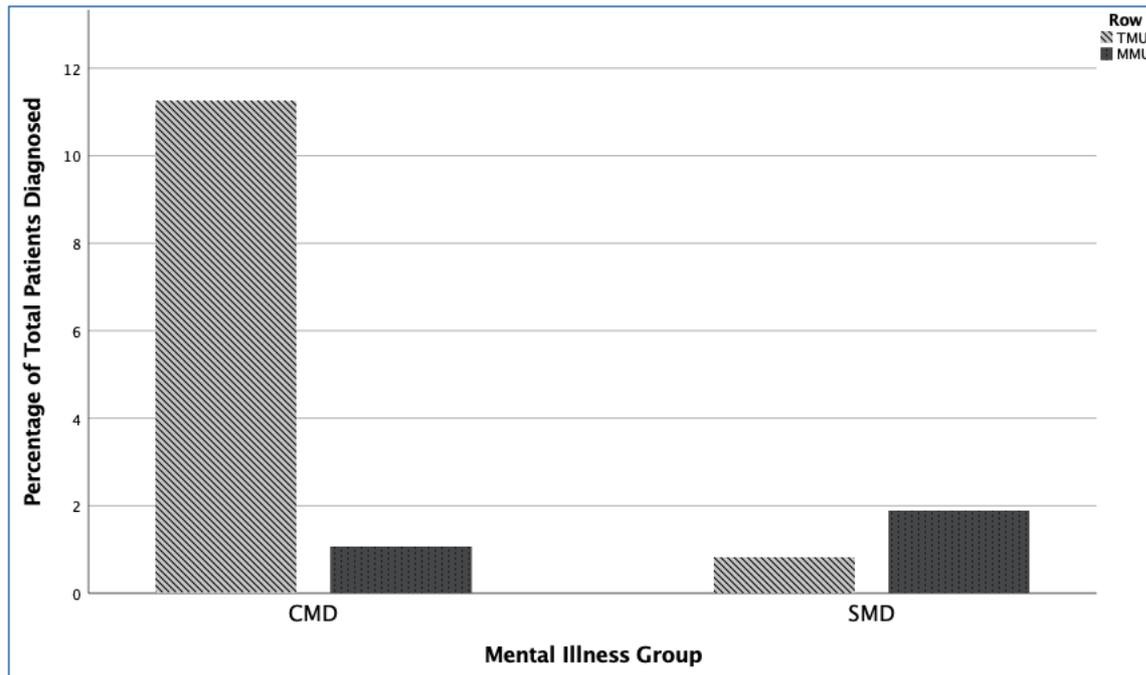


Figure 5: Detection rates across different patient groups

Table 06: Mean Duration of Follow Ups (in weeks)

	TMU				MMU			
	Total Number of Visits		Duration of follow up		Total Number of Visits		Duration of follow up	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
CMD	4	6	6.89	9.09	4	4	9.53	10.86
SMD	3	4	6.13	8.68	7	5	16.58	11.07
Other	1	3	2.56	5.48	1	2	2.77	5.89

The mean number of visits was higher for mental health disorders as compared to other presenting patients. Mean number of visits for CMD were the same at the TMU and MMU, while in the case of SMD, MMUs recorded higher number of mean visits. Mean duration of follow-up was higher for both CMD and SMD patients at the MMU in comparison to the TMU.

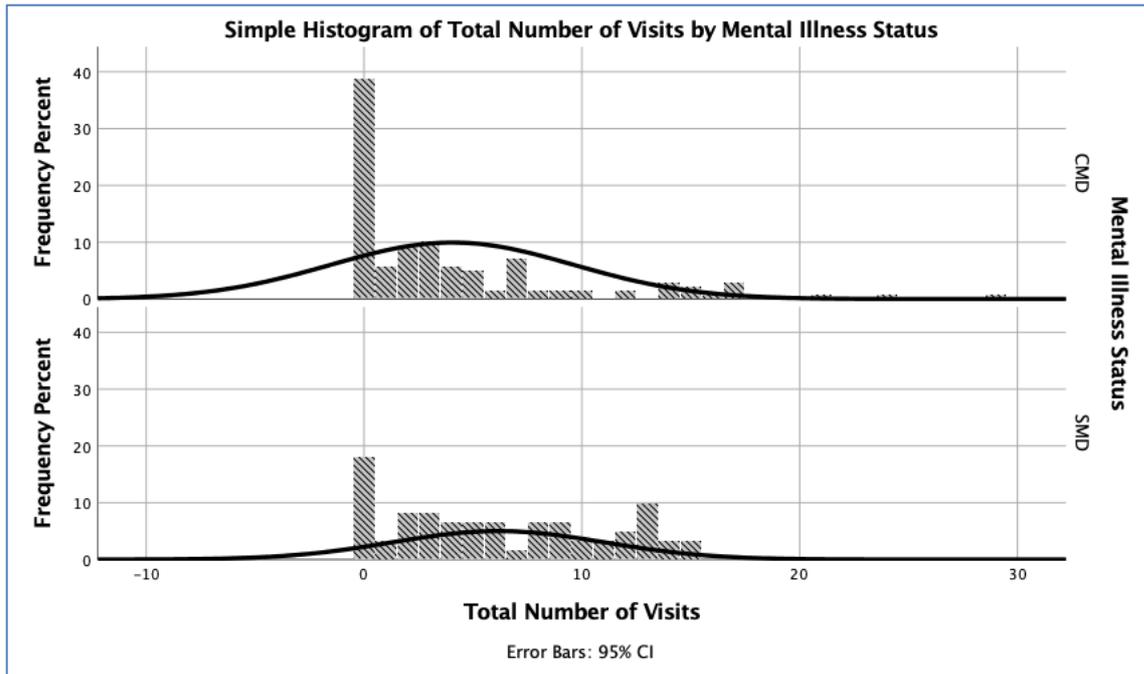


Figure 6: Histogram with normal curve of number of visits

Table 07: Comparison between sites on the basis of pre-existing community-based intervention

	Index Site		Other Sites		Total
	n	%	n	%	n
CMD	13	3.8%	126	3.7%	139
SMD	0	0.0%	61	1.8%	61
Total	342	100.0%	3418	100.0%	3760

No patients with SMD was detected at the index site where there was no ongoing community mental health program. In contrast, detection percentages of patients with CMD at this site was comparable to the other sites that had pre-existing programs.

Table 08: Patients who continue to use services from before the study period

	TMU				MMU			
	Old Follow-Up		New Registration		Old Follow-Up		New Registration	
	n	%	n	%	n	%	n	%
CMD	16	12.8%	109	87.2%	17	36.2%	30	63.8%
SMD	0	0.0%	8	100.0%	45	45.9%	53	54.1%
Other	73	7.9%	852	92.1%	608	18.3%	2708	81.7%
Total	89	8.4%	969	91.6%	670	19.4%	2791	80.6%

The MMU's have been functioning for 4.5 years before the study period. The patients who were on treatment from earlier, and who continued to remain on treatment during the study period, are shown as 'old follow-up'. The study patients (those who registered during the study period) are shown as 'new registration' for comparison. As the TMU's had been initiated only a few weeks before the study period, the 'old follow-up' group at the TMU's is small. However, once the TMU's were initiated in all the 5 villages, these old follow-up patients of CMD and SMD had the choice of continuing their treatment at either the TMU or MMU.

We can see that *all* 45 of the old follow-up SMD patients (who were earlier visiting the MMU) continued to visit the MMU; none shifted to the TMU. These old follow-up SMD patients made up 46% of the total SMD patients treated at the MMU during the study period. For comparison, among the 33 old follow-up CMD patients, only half (17) continued to visit the MMU during the study period.

Table 09: Percentage of patients that remain on treatment at the end of the study period

	TMU		MMU	
	On Treatment		On Treatment	
	n	%	n	%
CMD	32	25.6%	23	48.9%
SMD	3	37.5%	59	60.2%

At the end of the study period, at the TMU 25.6% of CMD patients and 37.5% of SMD patients continued to stay on treatment. At the MMU 48.9% of CMD patients and 60.2% of SMD patients continued to be on treatment. There was a significantly higher rate of treatment continuation at the MMU ($\chi^2(1,200) = 12.39, p=0.00$).

DISCUSSION

DEMOGRAPHIC DISTRIBUTION OF PATIENTS

Looking at the CMD demographics, a majority of the patients were female in their fourth decade of life. This is a shift from the profile of the presenting patients.

This is also in contrast to the National Mental Health Survey (NMHS) findings from Uttar Pradesh done in 2015¹⁴. The survey was a stratified randomized cluster sampling with a house to house interview. A This difference can imply that women are more likely to seek out medical help for CMDs (given our sampling was patients presenting to the health care unit).

SMD patients were predominantly male with younger presentation, similar to the NMHS findings¹⁴. These findings can help us focus more attention to the appropriate demographic while conducting community-based interventions and while training general physicians in mental health.

COMPARISON OF MH-PHYSICIAN WITH PSYCHIATRIST

The study permitted the comparison of the non-specialist physician at the TMU with a psychiatrist, who treated the same set of patients in the same manner as the physician. The patients were blinded to the specialization of the physician they were being treated by, thereby ruling out any reporting or selection bias on their part. The comparison showed no difference in their detection rates of mental disorders. This finding demonstrates that a non-specialist physician, with sufficient training and experience in mental health, can be as effective a mental health specialist in detecting psychiatric disorders while treating primary care patients via tele-medicine.

COMPARISON ACROSS THE TWO FORMATS FOR CMD AND SMD

Certain features in the design of the study facilitated the comparison between the two treatment delivery formats of VC (at TMU) and F2F (at MMU). Firstly, the TMU's and MMU's were *simultaneously* operating at the *same* villages, and the demographic characteristics of the patients registering at the TMU and MMU were comparable. Secondly, the physicians providing treatment in both formats were comparable in training and experience in mental health. By controlling for these possible confounding variables, it is possible to attribute any findings that emerge to the effect of the treatment delivery format – MMU or TMU.

CMD

Persons with CMD typically report their psychological distress along with physical symptoms. They usually present to the primary physician with these complaints. Therefore, a primary care physician who is trained to respond to these overlapping bodily and psychological complaints is the person most appropriately placed to identify and treat such patients. The TMU physician was able to identify CMD in more than 10% of patients, which is in keeping with the reported prevalence rates¹⁴. Because she is visiting a general medical clinic, the patient does not feel stigmatized. It is moot whether these patients would visit, or even be willing to visit, a conventional telepsychiatry center, after knowing that it was for treatment for mental illnesses.

There are many ground realities that interfere with the fulfilment of the potential of useful innovations. One such reality is the huge work load that primary physicians are burdened with. It is difficult for physicians, however sensitive and well-trained they are, to ensure that a person with emotional distress receives the basic amount of time and privacy that is required for the diagnosis and treatment. The MMU physicians were comparably trained. and had demonstrated effectiveness in detecting both CMD and SMD in the earlier phases

of the program⁶ In this study period however, their CMD detection rate was *ten times lower* than that of the TMU physician. One reason for this could be that they attended to *three times more* patients than their TMU counterparts.

SMD

Not a single patient with SMD was enrolled in the index site that had no pre-existing community mental health program prior to the study period. In the other four sites, where such a program was ongoing, the detection rate for SMD was 1.8%. This shows that it is not just enough to place a doctor on-site, physically or virtually. A sustained community education and awareness program is required to bring SMD patients into treatment. This requirement seems specific to SMD; the pooled CMD detection rate at the index site was identical to the other sites.

On many parameters, patients with SMD showed a preference for the MMU's across all sites. Compared to the TMU, the MMU detection rates of SMD were higher. The old follow-up patients of SMD all continued to visit the MMU during the study period. At the MMU's, the mean number of visits and mean duration of follow-up for SMD patients was higher, as was the proportion of SMD patients who remained on treatment at the end of study period. These findings indicate that factors like preference for face-to-face contact, familiarity and rapport with the treating doctor, and word-of-mouth referrals, influence the help-seeking behavior of persons with SMD. This is common knowledge amongst clinicians, but these findings substantiate their importance in the context of a comparison between these two formats of healthcare delivery. A hybrid telemedicine-cum-physical presence service, like this TMU-MMU combination, might prove to be the most effective method to treat community mental health illnesses at a primary care level.

CONCLUSION

The use of integrated tele-mental health is an effective model in reducing the treatment gap and empowering the primary care physicians in delivering mental health care. With adequate training MH-physicians can be at par with mental health professionals for screening for mental health disorders and reducing the treatment gap. The presence of a team living within the community helps build community relations and deliver psychosocial interventions, that complement the pharmacological component of treatment. Given the scalable nature of the technology there are virtually no limitations to the implementation of the services on a large scale. A large scale implementation of an integrated tele-mental health program is called for to build upon this study's results.

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