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**Increasing Access to Rural Mental Health Care
Using Hybrid Care That Includes Telepsychiatry**

M. Courtney Hughes, Jack M. Gorman, Yingqian Ren, M.S., Sana Khalid, Carol Clayton

Abstract

There is a lack of access to mental health care in rural areas of the United States. One potential strategy for increasing access and improving health outcomes for rural dwellers is offering hybrid psychiatric care, a combination of in-person and telepsychiatry services. Although prior research shows telepsychiatry can help overcome access barriers, there is a lack of research on the use of hybrid care for patients in rural areas following an inpatient admission or an emergency department visit—a time when many patients are in high need of follow-up care. The aim of this project was to examine process and outcome measures associated with mental health to determine the effectiveness of delivering hybrid care to Medicaid-covered patients in rural Missouri following an inpatient admission or an emergency department visit. Data from 242 patients were analyzed using a retrospective quasi-experimental design. The group with hybrid telepsychiatry plus in-person visits had improved timeliness of care and increased number of total outpatient encounters compared to the group with in-person visits only, indicating hybrid care may be more effective than in-person visits alone. The current study suggests that offering telepsychiatry can help close the gap in access to mental health care between rural and urban populations, particularly during the time after an inpatient admission or an emergency department visit. As telepsychiatry service options continue to grow, making this delivery mode available to rural populations may have a positive impact on mental health outcomes in the United States.

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Increasing Access to Rural Mental Health Care Using Hybrid Care That Includes Telepsychiatry

M. Courtney Hughes, Jack M. Gorman, Yingqian Ren, M.S., Sana Khalid, Carol Clayton

There is a lack of access to mental health care in rural areas of the U.S. (Schopp, Demiris, & Glueckauf, 2006) and among disadvantaged groups (Cummings, Allen, Clennon, Ji, & Druss, 2017), thereby decreasing patients' chances of receiving care and improving their mental and physical health. Sixty-five percent of non-metropolitan counties do not have a psychiatrist (Andrilla, Patterson, Garberson, Coulthard, & Larson, 2018), and, in multiple surveys, primary care providers report difficulties of obtaining specialist mental health referrals for their rural and low-income patients (Cook et al., 2007; Rust et al., 2005). Primary care providers often must treat patients with serious mental illness without specialist support.

Because one-fifth of the U.S. population lives in a rural area and about one-fifth of these rural dwellers (or 6.5 million people total) have a mental illness (Substance Abuse and Mental Health Services Administration, 2017; United States Census Bureau, 2016), the shortage of mental health specialists presents particular public health challenges. In Missouri, the U.S. state sourcing this study's data, the suicide rate in rural areas rose twice as quickly as in urban areas from the year 2001 to 2011, and 98 of its 101 rural counties are designated by the U.S. Health Resources and Services Administration (HRSA) as mental health professional shortage areas (Missouri Office of Primary Care and Rural Health, 2014). HRSA determines a geographic shortage based on the number of providers for the entire population within a defined geographic area (Health Resources & Services Administration, 2018). It is clear, therefore, that millions of people with potentially treatable mental illnesses who live in rural areas and their primary healthcare providers are unable to access evidence-

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based treatment from qualified mental health care specialists. In addition to attempts to recruit psychiatrists and other mental health care providers to rural areas, technological solutions to this serious problem are now being sought.

Telepsychiatry is a delivery modality for behavioral health services that uses two-way real-time interactive audio and video communication between a psychiatrist and a patient, each in different locations (North Carolina Division of Medical Assistance Medicaid and Health Choice, 2018). Typically, telepsychiatry is used when a medical provider wants to refer patients living in a rural area to a psychiatrist, but none are locally available. In this situation, patients go to a local health clinic or hospital and connect via a secure video conference to a psychiatrist located in an urban area (Lauckner & Whitten, 2016).

Prior research has shown that telepsychiatry can be an effective means of psychiatric care delivery that can help overcome the barrier to care present when the provider and patient cannot be in the same location (Chakrabarti, 2015; Hilty et al., 2013; Waugh, Voyles, & Thomas, 2015). There is a lack of research, however, on the use of “hybrid” care, or a combination of telepsychiatry and in-person care, for patients in rural areas following an inpatient admission or an emergency department visit. Following hospitalization, many patients are in high need of follow-up care (Carson, Vesper, Chen, & Le Cook, 2014; Olfson et al., 2016), and previous studies show that rural patients are less likely to receive such follow-up care than urban patients (Li, Proctor, & Morrow-Howell, 2005; Toth et al., 2017). This study aims to examine a variety of medical process and outcome measures associated with mental health to determine the effectiveness of delivering hybrid psychiatric care following an inpatient admission or an emergency department visit to Medicaid-covered patients in rural Missouri whose healthcare was managed by Genoa Healthcare, a provider of

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pharmacy, outpatient telepsychiatry, and medication management services in the U.S.

Method

Participants and Interventions

In this nested case-control analysis, patients covered by Medicaid in Missouri between the ages of 18 and 64 with age defined at the point of the first psychiatry outpatient visit were eligible for the study. To be included in the intervention group ($n = 62$), patients must have had a minimum of one telepsychiatry appointment following either a behavioral health (BH) or substance use disorder (SUD) hospitalization, or a BH/SUD emergency department (ED) visit, with continuous Medicaid eligibility measured by one paid claim as proxy for eligibility during the study period. Patients in the intervention group also had in-person outpatient visits with a mental health care provider, making their care practiced in a hybrid manner (Yellowlees & Shore, 2018). To form a control group of three comparison patients for every patient in the telepsychiatry intervention group, we randomly selected 180 patients who received only in-person outpatient services from a total of 1210 patients in the database from the same Medicaid program population. Outpatient psychiatry visits included any behavioral health outpatient code but excluded urgent care and inpatient codes. Those patients who enrolled in services after June 1, 2017, were excluded because they had not been in the treatment program for 90 days by the end of the study (August 31, 2017) and did not have 90-days retention data. All patient data were de-identified.

This study is a retrospective quasi-experimental examination of Medicaid claims data obtained from Missouri's Medicaid Program, MO HealthNet. We used data from service dates ranging from September 1, 2016, through August 31, 2017. Telepsychiatry appointments were limited to select providers rendering telepsychiatry services within

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specific agencies, as identified by Genoa Healthcare, and were identified by the “GT” modifier on their claims.

As shown in Table 1, we matched level of sickness from the intervention group dataset to the control group dataset based on minimum differences across selected demographic variables (age, sex) and diagnostic variables such as behavioral health diagnostic history and serious mental illness status. Goodness-of-fit was evaluated by testing for statistically significant differences between the two groups across the matching variables. Among these matching variables were three measures of overall illness severity: the Charlson Comorbidity Index (CCI) and both the Prospective and the Concurrent scales of the Chronic Illness and Disability Payment System (CDPS) (D'Hoore, Bouckaert, & Tilquin, 1996; University of California, 2012; Wright, Gorman, Odorzynski, Peterson, & Clayton, 2016). No statistically significant difference was detected in matched variables between the intervention and control groups, exemplified by p -values $>.05$ in each metric examined, except for the rate of diagnosis of bipolar disorder.

For all patients, initial appointments were approximately 45 minutes, and follow-up appointments were approximately 15-20 minutes depending on patient acuity. One of eight psychiatrists or advanced nurse practitioners (APRNs) with expertise in mental health disorders conducted both in-person visits and telepsychiatry visits. For telepsychiatry appointments, a staff member would escort the patient into the telepsychiatry room and set the patient up to be seen by the psychiatrist and/or APRN via a HIPAA compliant video conference browser, and then the staff member would leave the room.

Measures

For purposes here, the index date refers to the date of the first follow-up outpatient

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appointment after a hospitalization or an ED visit for serious mental illness (SMI) care or alcohol or drug use. The follow-up period under examination in the analysis was the 11 months immediately following the first follow-up outpatient visit. There were four process variables and one outcome variable measured. The process measures were the number of days to first follow-up appointment after the index appointment (i.e., timeliness of care), psychiatry outpatient visits in the follow-up period, ED visits in the follow-up period, and readmissions (average percentage of patients per month having a hospitalization after first discharge). The outcome measure was antipsychotic medication adherence during the follow-up period. Patients were defined as adherent to medication if their measure of proportion of days covered (PDC) with medication based on prescriptions filled over the measurement period was 80% or higher, to align with current standards for medication adherence (Nau, 2012).

Data Analysis

We tested differences between the two treatment groups for demographic and baseline variables using the following three different statistical tools depending on the variables: a two-sided, two-sample Students' t-test for age; Chi-squared test for gender and rate of mental illness diagnosis; and Wilcoxon rank sum test without normal distribution assumption for CCI Score and CDPS Score (D'Hoore et al., 1996; University of California, 2012; Wright et al., 2016). Differences between the intervention and control groups on measures were tested by longitudinal modeling with a logit link and unstructured covariance matrix with adjustment for covariates. Data collection was done using Microsoft Azure database and SQL Server Management Studio 17. All statistical analyses were performed with R for Windows, version R 3.4.3. All statistical tests were two-tailed, and significance was determined at the

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0.05 level. Because we regard this as an exploratory analysis we did not adjust probability levels for multiple comparisons.

Results

A total of 242 patients were included in this study. The percentage of patients in the intervention group who received at least 25% of their visits in the form of telepsychiatry was 27.4%. Table 2 reports the results and statistical analyses for the 11 months after the index date. The average timeliness of care per patient in the intervention group was 16.4 ($SD = 29.9$) days versus 23.6 ($SD = 37.6$) days for the control group ($p = .008$). Sixty-seven percent ($SD=12.9\%$) of patients in the intervention group had at least one outpatient encounter per month compared to 50.3% ($SD=17.2\%$) of the control group ($\chi^2 = 15, df = 1, p < .001$). There were no statistically significant differences between groups for ED visits, antipsychotic medication adherence, and readmissions.

Figure 1 shows the average percentage of patients per month who had a psychiatry outpatient encounter for both the intervention and control groups for the 11 months both before and after the index dates. The log odds ratio for the intervention group from longitudinal modeling is 0.756, indicating that patients in the intervention group were 2.13 times more likely than patients in the control group to have a psychiatry outpatient visit ($p < .001$).

Discussion

It is well-recognized that serious differences in access to mental health care exist between urban and rural areas of the United States (National Council Medical Director Institute, 2017). One proposed method to close this gap is the use of telepsychiatry as part of a hybrid care model to make specialist mental health care available to people with mental

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health disorders who live outside of cities (Yellowlees & Shore, 2018). This study provides data showing that hybrid care delivered in a rural area may strengthen a patient's willingness and ability to engage in outpatient care. We show that patients who had hybrid care had improved timeliness of care and an increased number of total outpatient encounters compared with patients who had only in-person outpatient visits. These findings indicate that hybrid care may be more effective than in-person visits alone and suggest integrating telepsychiatry consults into traditional in-person care systems.

Antipsychotic medication adherence was not statistically significantly higher for the intervention group than it was for the control group. Prior research shows that improving psychotropic medication adherence often requires a multifaceted approach (Semahegn et al., 2018). It could be that an additional strategy (e.g., sending patients regular reminders via text messages; Costa et al., 2015) delivered along with telepsychiatry may be more effective in improving medication adherence. Also, we have previously shown that providing pharmacies at the site where patients receive their mental health care can improve adherence to medication (Wright et al., 2016).

The percentage of intervention group patients who had at least one ED visit in the follow-up period was not statistically significantly higher than in the control group. This suggests that telepsychiatry visits might be supplemented with other forms of online interventions that a patient can access after-hours and that telepsychiatry visits should include offering patients alternatives to using the ED when appropriate. Additionally, the average percentage of intervention group patients who had readmissions per month was not statistically significantly lower for the intervention group than the control group.

An important consideration in evaluating process and outcome measures that were not

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statistically different between groups is that hybrid psychiatry care need not necessarily be shown to be superior to in-person psychiatry care to be useful and important. In rural areas, where there is markedly reduced access to live psychiatric care (Andrilla et al., 2018), finding that hybrid care is an acceptable alternative would be sufficient to justify its use. We encourage future studies examining telepsychiatry's ease of use and accessibility among rural populations to help determine its feasibility and better understand the patient's experience with such technology.

The results herein may have different implications for states that have and have not expanded Medicaid. Studies show that Medicaid expansion is positively associated with greater access to care and medication among individuals with SMI (Fry & Sommers, 2018; Han et al., 2015; Wen, Druss, & Cummings, 2015). In states that have expanded coverage, more individuals with SMI have Medicaid coverage than before expansion and, depending on the specific state's coverage policies for telemedicine (Centers for Medicare & Medicaid Services), may have greater access to psychiatric services by using hybrid care. For states such as Missouri that have not expanded Medicaid coverage, rural low-income populations are particularly at a disadvantage for receiving psychiatric care as studies have shown Medicaid expansion increases access more for rural than urban populations (Foutz, Artiga, & Garfield, 2017; Soni, Hendryx, & Simon, 2017).

A limitation to the current study is that the intervention and control group were not randomly assigned, so there may be selection bias. Assignment to the study group was based on whether the patient had a minimum of one telepsychiatry appointment following either a BH or SUD hospitalization or a BH or SUD ED visit. There is a chance that patients who had a telepsychiatry appointment had certain characteristics (e.g., concern for their medical

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condition, more comfort with technology and reading online about their condition), which made them more likely to have visits (telepsychiatry or in-person) with a psychiatrist, which could affect the results of the study. To counteract potential selection bias, we matched patients from the intervention and control group based on demographic and diagnostic factors so that the two study groups were not significantly different across several key variables. The only variable with a statistically significant difference between the two groups was the rate of diagnosis of bipolar disorder. However, the absolute difference in rates of bipolar disorder diagnosis between groups was small, and therefore we believe unlikely to introduce bias into the analysis. Another limitation of this study is that data came from one U.S. state's Medicaid program. Future studies examining claims data from rural areas in other states are needed to validate these findings. Finally, we did not compare telepsychiatry alone versus in-person services as our intervention group had access to both. Future studies should examine whether telepsychiatry visits offered as the only outpatient service provides at least equally good outcomes as in-person encounters with a mental health specialist.

Conclusions

Overall, the results suggest that hybrid care can increase the number of psychiatric visits and timeliness of care among patients with SMI who live in rural areas. Although antipsychotic medication adherence and readmissions showed signs of improvement with hybrid care, these results were not statistically significant. We recommend future studies that explore combining telepsychiatry with other interventions to determine effective ways health systems and the government can leverage telepsychiatry to make a positive impact on medication adherence. With the high prevalence of SMI in the U.S. and lack of access to mental health services in rural areas, utilizing technology to facilitate care by connecting

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providers and patients may be an integral component to decreasing adverse mental health outcomes across the country.

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Table 1

Comparison of Treatment and Control Across Matching Variables

Matching Characteristics	Intervention (n = 62)		Control (n = 180)		Net Difference	% Difference (Absolute Value)	p
	Average	SD	Average	SD			
Age (years)	38.2	11.0	39.0	12.3	- 0.9	2.2%	.612
Female	47%	0.5	53%	0.5	- 6.0%	11.4%	.504
SMI	80.7%	0.4	84.4%	0.4	- 3.8%	4.5%	.720
ADHD	11.3%	0.3	12.8%	0.33	- 1.5%	11.6%	.934
Anxiety	53.2%	0.5	61.7%	0.5	- 8.4%	13.7%	.309
Bipolar	59.7%	0.5	42.8%	0.5	16.9%	39.5%	.031
Dementia	6.5%	0.3	7.2%	0.3	- 0.8%	10.7%	.994
Depression	56.5%	0.5	61.1%	0.5	- 4.7%	7.6%	.620
Developmental	3.2%	0.2	7.8%	0.3	- 4.6%	58.5%	.343
Mood Disorder	19.4%	0.4	15.0%	0.4	4.4%	29.0%	.546
PTSD	46.8%	0.5	42.2%	0.5	4.6%	10.8%	.635
Schizophrenia or Psychosis	32.3%	0.5	35.0%	0.5	- 2.7%	7.8%	.813
IDD	3.2%	0.2	7.8%	0.3	- 4.6%	58.5%	.343
Other	54.8%	0.5	65.6%	0.5	- 10.7%	16.3%	.176

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CCI Score	1.94	2.3	1.91	1.1	0.0	1.3%	.529
CDPS Score	2.94	1.5	2.63	1.1	0.3	11.7%	.175
Prospective							
CDPS Score	4.12	2.7	3.46	2.7	0.7	18.9%	.075
Concurrent							
<p><i>Note.</i> All medical conditions are “rate of diagnosis”; <i>p</i>-values use Pearson's Chi-squared test except for age which uses Student's <i>t</i>-test and CCI and CDPS scores which use Wilcoxon rank sum test; SMI = serious mental illnesses; ADHD = attention deficit hyperactivity disorder; PTSD = post-traumatic stress disorder; IDD = Intellectual or Developmental Disabilities; CCI = Charlson Comorbidity Index; CDPS = Chronic Illness and Disability Payment System.</p>							

Table 2

Results

Process & Outcome Variables	Intervention (<i>n</i> = 62)		Control (<i>n</i> = 180)		Net Difference	% Difference (Absolute Value)	<i>p</i>
	Average	SD	Average	SD			
Timeliness of care (days) per patient	16.4	28.9	23.6	37.6	- 7.2	30.5%	.008
Outpatient encounters	67.0%	12.9%	50.3%	17.2%	16.8%	33.4%	<.001
ED visits	31.9%	9.1%	26.9%	8.4%	5.0%	18.5%	.230
Medication adherence (PDC)	37.3%	9.0%	33.0%	4.5%	4.3%	13.0%	.730
Readmissions	5.1%	3.5%	5.3%	2.9%	- 0.2%	4.3%	.389

Note. Averages are per treatment group unless specified per patient; *p*-value is from ANOVA; Timeliness of care was calculated using the Wilcoxon rank sum test; all other variable measures used longitudinal modeling with a logit link and an unstructured covariance matrix; Medication adherence reports the average monthly percentage of patients over the 80% PDC threshold; all other average percentages report the average percentage of patients per month who had such a visit over the 11 months following the index date.

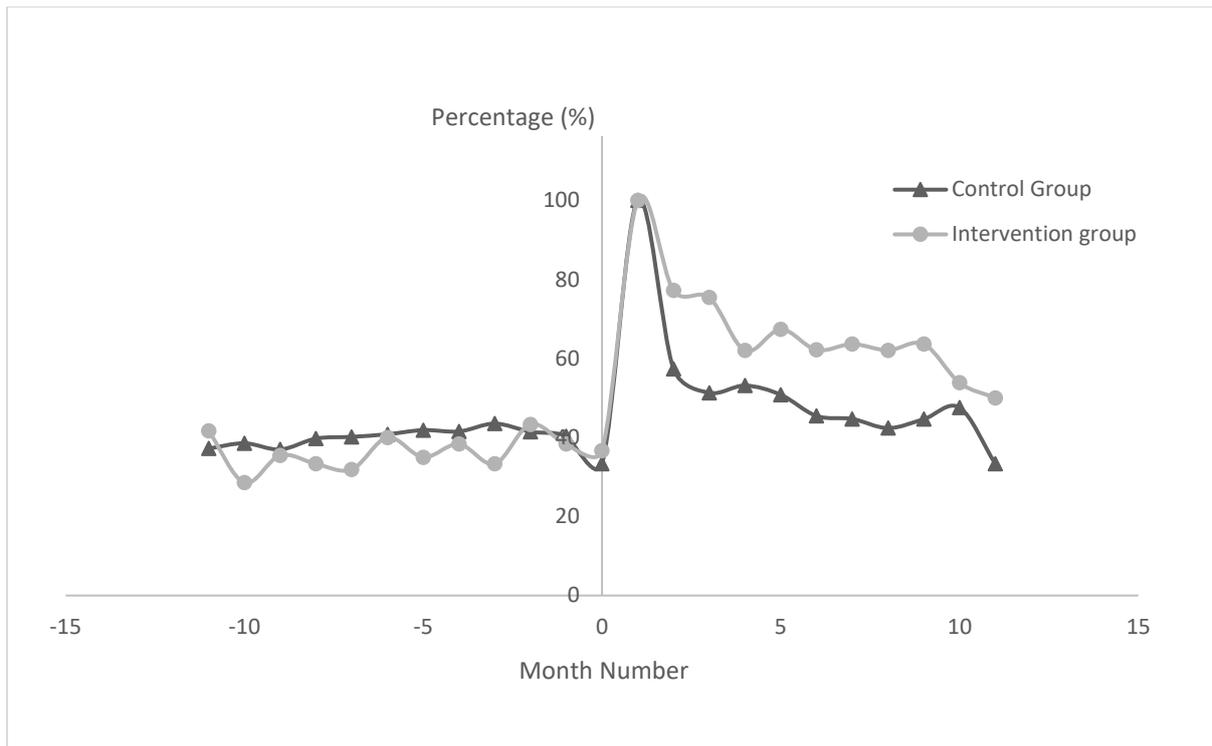


Figure 1: Psychiatry outpatient encounters. This figure illustrates the percentage of psychiatry outpatient encounters.