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Bringing Specialty Telebehavioral Medicine Home: Feasibility of a Quality Improvement Pilot for Medically Complex Patients

Lillian M. Christon,[1] Jennifer Correll,[1] Wendy Balliet,[1] Eva R. Serber,[1] Sharlene Wedin,[1] Rebecca Kilpatrick,[1] Lauren Holland-Carter,[1] Stacey Maurer,[1] Jimmy McElligott,[2] Kelly Barth,[1] Jeffrey J. Borckardt[1]

Affiliations: [1]Department of Psychiatry and Behavioral Sciences, Medical University of South Carolina, Charleston, South Carolina; [2]Department of Pediatrics, Center for Telehealth, Medical University of South Carolina, Charleston, South Carolina

Corresponding Author: Lillian M. Christon, Email: christon@musc.edu

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Objectives: *The aims of this quality improvement project were twofold: Phase 1: conduct a needs assessment study for home-based telebehavioral medicine (H-TBM) among medically complex patients living in rural areas seeking care at an academic medical center (AMC) in a Behavioral Medicine Clinic, and Phase 2: evaluate the feasibility of a pilot implementation of H-TBM to improve therapy access for these underserved patients.*

Results: *The needs assessment study supported patient interest and need for H-TBM services. In the pilot, patients and providers were "satisfied to completely satisfied" using H-TBM. Patients engaging in H-TBM (Phase 2) reported significantly lower acute distress after H-TBM sessions than they experienced prior to sessions ($t(29)=4.26$; $p<.001$).*

Conclusion: *Results demonstrated preliminary acceptance by and feasibility for Behavioral Medicine Clinic patients with complex medical conditions to receive psychotherapy via H-TBM (in their homes), reducing their travel burden. H-TBM services offer the following benefits to chronically ill patients: they help to manage psychosocial complications associated with chronic disease and to prepare for intensive medical interventions.*

Patients with chronic medical conditions living in the more rural states of the United States may experience unique barriers when attempting to access specialty medical and mental health care. Specialty care is typically offered in larger cities by academic medical centers (AMCs), requiring individuals

who need or would benefit from these services to travel long distances from their homes to those cities. Academic medical centers in rural states, such as South Carolina, serve many patients living within counties designated as Health Professional Shortage Areas (HSPAs) or Medically Underserved Areas.[1] The HSPA designation indicates a shortage in healthcare providers; in these areas, access to medical care, especially specialty care and mental/behavioral healthcare, is particularly limited.[1] Roughly 123 million individuals in the United States live in mental health HSPAs, with 1.9 million residing in South Carolina.[2]

Behavioral medicine psychological services are one domain of specialty mental healthcare aimed at managing psychosocial complications associated with serious chronic medical conditions (e.g., end-stage organ diseases). Psychological treatment/psychotherapy is an important component of specialty care for a range of chronic medical conditions. Treatment by behavioral medicine providers focuses on the integration of psychosocial, behavioral, and biomedical knowledge and techniques to facilitate improved outcomes in the context of chronic illnesses.[3] Behavior change is a cornerstone of health, particularly for the prevention of future disease and improving self-management and adjustment to current chronic illness and overall quality of life.[4] Untreated mental health problems in patients with serious chronic illnesses can lead to poor adherence to medical treatments and overall poorer health outcomes, such as organ rejection in post-transplant patients.[5]

In order to obtain specialty behavioral medicine treatment, individuals must often travel to AMCs where these services are offered. Travel for these services is costly, requiring investment of time and money.[6] Medically complex patients are often too ill to regularly travel long distances to receive healthcare, particularly specialty behavioral medicine services (i.e., psychotherapy), which may have more frequent treatment sessions than other medical office appointments. Thus, access to optimal psychological care for those with complex medical conditions is often limited, given the nature of the specialty and patients' potential physical impairments and medical complexity. Providing access to specialty behavioral medicine services is an extraordinary challenge in rural states, and was the target of this quality improvement (QI) pilot.

Telemedicine and telehealth are potential solutions to improve access to care through the use of technology. They involve a provider (located at a distant site) communicating, via a synchronous video-conferencing software, with a patient who is in their local community (originating site). The originating site in the patient's local community may either be an external center/site equipped with HIPPA-compliant (i.e. compliant with the Health Insurance Portability and Accountability Act Security Rule) video technology (e.g., a primary care provider's office) or direct-to-consumer (home-based), where patients are able to access this technology in the privacy of their own homes.[7] Different variants of home-based tele-services (e.g., remote monitoring of disease, virtual physician "house calls," psychiatry teleconsultation, nursing coaching) have been studied in diverse patient groups, such as patients with Parkinson's disease, rural nursing home residents, patients with type 2 and gestational diabetes, and more broadly, those with comorbid chronic disease and behavioral health concerns, among others.[8,9,10,11,12] Outcomes suggest that telemedicine interventions broadly perform equitably to in-person services, and both patients and providers are satisfied with these services.[8,9,10,11,12]

TeleMental Health (TMH), a subset of telemedicine, uses technology to provide

mental health services from a distance, and is a relevant mode of treatment to be considered for patients needing specialty behavioral medicine treatment. Specific guidelines for practice of TMH have been developed for scope of practice and technology guidelines, including transmission speed and bandwidth.[6,13] Research indicates that TMH is effective and performs comparably to face-to-face care across settings and populations, though most of this work has been done on center-delivered (vs. home-based) services.[6,13,14,15,16,17,18,19] Drop-out rates may be higher in center-delivered telehealth for medically complex patients, for instance, due to flare-ups of physical illness, and home-based care may circumvent some of the challenges for patients in both in-person psychotherapy and center-delivered psychotherapy.[17,18]

The term telebehavioral medicine (TBM) was coined by Schwagar in 2016[20] to refer to the subset of TMH that focuses on providing psychological and psychiatric care via synchronous telehealth to patients with chronic illnesses in home settings. Here, the implementation of TBM in a home-based fashion (vs. center-based) is discussed as similar to a "'house call' as a means of getting to 'see the entire picture'" of the chronically ill patient.[20] Home-based TBM (H-TBM) is ideal for chronically ill patients for multiple reasons: it increases convenience, reduces financial burden of travel, can happen even when physical symptoms of illness are present, avoids mobility challenges, and allows for availability of caregivers during appointments.[18,20] It also affords providers the opportunity to "learn much more about their patients when the provider is the 'guest' in the patient's home versus the patient as the 'customer' in the provider's office."[20] Most importantly, H-TBM has the potential to provide specialty behavioral medicine psychotherapy aimed at managing psychosocial factors associated with chronic disease to individuals who may otherwise face significant or prohibitive barriers to receiving this treatment. While H-TBM has great potential, less is known about the feasibility, patient/provider satisfaction, or clinical outcomes of the implementation of H-TBM with medically complex patients, such as those with end-stage organ diseases.

The Medical University of South Carolina (MUSC) draws patients from diverse areas of South Carolina, especially for specialty care associated with end-stage organ diseases and organ transplantation. In the Behavioral Medicine Clinic (BMC) at MUSC, psychology and psychiatry providers partner to support the behavioral medicine and mental health needs of patients with complex medical conditions. This includes providing psychological evaluation and psychotherapy services to pre- and post-surgical patients (transplant, bariatric, total pancreatectomy surgeries) and patients with other complex medical conditions requiring significant comprehensive care, such as cystic fibrosis or cardiac conditions. The aims of this QI project were: Phase 1: conducting a needs assessment for H-TBM services among patients who are treated in this clinic, and Phase 2: evaluating the feasibility of initial implementation of H-TBM services for these patients with complex medical conditions, with the ultimate goal of improving access and service delivery for these underserved patients.

MATERIALS AND METHODS

This pilot involved a partnership between MUSC's Department of Psychiatry and Behavioral Sciences' Behavioral Medicine Clinic (BMC) which serves patients with chronic medical and psychological conditions, and the South Carolina Center for Telehealth. The BMC receives referrals for behavioral medicine and mental healthcare for patients with chronic health/medical conditions from other outpatient and

inpatient AMC specialty services (transplant surgery, gastrointestinal surgery, pulmonary and critical care, etc.) and primary care. The project was certified as consistent with QI by the MUSC QI Program Evaluation Self-Certification Tool; IRB review of the project was not required. All data were analyzed using SPSS v25. Phase 1 occurred from March 2015 to May 2015, while Phase 2 occurred from June 2016 to July 2017. These phases were distinct, and both phases occurred within the BMC, and thus with the patients with chronic medical conditions served in this clinic. As patients completing the needs assessment questionnaire in phase 1 were anonymous, overlap between patients in phase 1 and phase 2 is unknown.

Phase 1: Needs Assessment for H-TBM Services

From March to May, 2015, patients who presented, in person, to the outpatient BMC at MUSC were invited by providers and clinic staff to complete a voluntary and anonymous needs assessment questionnaire about H-TBM services. Copies were also available at the reception desk and in the waiting room (Appendix A). The assessment was given to all possible patients, yielding a convenience sample. The questionnaire (designed by the second author, J.C.) was brief (<3 minutes) and included questions about the reason for the current visit, distance from the AMC, access to the AMC, as well as comfort with and interest in receiving H-TBM services. Limited demographics were gathered, and data were kept anonymous, de-identified, and unlinked to the patient's medical chart. Paper copies of the questionnaire were entered by the clinic staff into a dataset.

Population

Patients (*N*=66) who completed the survey were attending a range of appointments in the BMC, summarized in Table 1.

Data analysis

Descriptive analyses were conducted on the needs assessment questionnaire data using SPSS v25.

Phase 2: Feasibility of a Pilot Program of H-TBM Services

Screening process

A brief screening tool was developed to assist providers in the BMC in determining if a patient might be appropriate for H-TBM services, using published guidelines (Appendix B).[21] Patients deemed eligible for H-TBM services were those with chronic illnesses and who answered "yes" to all PART A questions (e.g., >50 miles away). Patients who were not eligible for H-TBM were those who answered "yes" to any of the PART B questions (e.g., cognitive disorder).

The rationale for excluding patients with serious cognitive concerns was that they might have

Table 1. Patients completing needs assessment questionnaires, phase 1 (N=66)

Types of appointments	*n* (%)
Pre-transplant surgery psychosocial evaluation	20 (30.3%)
Pre-bariatric surgery psychosocial evaluation	19 (28.8%)
General intake for psychotherapy	1 (1.5%)
Total pancreatectomy with islet cell auto-transplantation psychosocial evaluation	2 (3.0%)
Psychiatric medication consultation or ongoing medication management	3 (4.5%)
Ongoing individual psychotherapy	21 (31.8%)

needed additional supports (e.g., written or visual materials) more amenable to in-person care. Patients with serious psychiatric concerns (e.g., active psychosis, suicidality) were excluded because they would require a higher-level of care than could be provided by H-TBM. Patients with substance use concerns were excluded as these patients required in-person laboratory testing (urine, blood) alongside their therapy sessions. Patients not eligible for H-TBM were offered in-person services, following standard of care.

Providers used this as a complement to their clinical judgment to determine the appropriateness of the patient for H-TBM services. They screened patients formally if they thought, based on referral information or conversations with the patient, they may be appropriate. Patients were screened from June 2016 to June 2017, and seen via H-TBM from June 2016 to June 2017, yielding a convenience pilot sample (Table 2). After this, patients could continue with services as clinically indicated, either in person or via H-TBM.

Training providers and patients

Prior to providing H-TBM services, all providers received training from the clinic's telehealth representative (L.C.), who was trained by the Center for Telehealth and had ongoing access to the telehealth network engineers and resources through the Center for Telehealth. The following learning documents were created for provider reference: (a) software and starting H-TBM

Table 2. Demographic and clinical information of patients who participated in H-TBM sessions, phase 2 (N=10)

Demographic and clinical information	*n* (%)
Gender	
• **Female**	4 (40%)
• **Male**	6 (60%)
Race/ethnicity	
• **Caucasian**	8 (80%)
• **African American**	2 (20%)
Primary medical condition	
• **Pulmonary**	5 (50%)
• **Renal**	3 (30%)
• **Cardiac**	2 (20%)
Psychiatric conditions (all diagnoses reported)	
• **Depressive disorder**	7 (70%)
• **Anxiety disorder**	6 (60%)
• **Psychological factors/maladaptive behaviors affecting general medical condition**	5 (50%)
• **Adjustment disorder**	3 (30%)
• **Substance use disorder in remission**	3 (30%)
• **Pain disorder**	1 (10%)
Age in years; mean (+ SD)	33.80 (+14.05)

visits, (b) instructions for setting up visits, (c) information for informed consent for patients and information to cover at the first visit, and (d) information covered at each subsequent telehealth visit. Each provider then trained their patients individually on using this technology, either in-person or via telephone prior to the H-TBM visit. A patient instruction handout was created and access to telehealth network engineers was available to assist with trouble-shooting technology problems.

Informed consent

All patients consented to services using the standard hospital informed consent (which includes video visits) at their in-person initial psychosocial assessment. Verbal informed consent was obtained by providers at the first H-TBM visit, where additional information was reviewed with patients, based on guidelines provided by the Center for Telehealth (Appendix C). Date of verbal informed consent was documented in the patient chart. Patients were told that an in-person visit could be arranged if at any time the provider or patient felt this was needed.

Appointment content, logistics, and risk management

This QI pilot was limited to patients already engaged in therapy services. All patients enrolled in H-TBM were initially evaluated in-person and met screening criteria (Appendix B) prior to initiating H-TBM services. These visits were conducted with funding from the Center for Telehealth. At the time of this project, none of the insurance companies were providing coverage and reimbursement for standard psychotherapy codes delivered as H-TBM. All services were delivered, with the distant site being the providers' office suite and the originating site being the patient's location of choice within the state of South Carolina (e.g., home, office). All H-TBM sessions were classified by providers in chart notes as delivering cognitive-behavioral therapies.

In each progress note (Epic template available upon request), special content was included to identify that the services delivered were via H-TBM. Distant site (provider) information in the note included the provider name, address at the time of service delivery, and confirmation of dated verbal informed consent. Patient safety (e.g., suicide risk) was thoroughly assessed with all patients in their initial assessment and taken into account for decisions around eligibility for H-TBM.(21) For risk management purposes, information on originating site (patient/home site) was updated for each H-TBM appointment to reflect patient's location at the time of service delivery. Prior to each H-TBM appointment, patients identified their emergency contact information for that visit along with the closest emergency room to their present location, and other safety contacts were reviewed as indicated (e.g., mobile crisis).

Measures

Prior to each visit, patients were asked to rate their distress over the past week on a Likert-type scale (0 = no distress, 10 = extreme distress). "How much distress have you been experiencing in the past week including today?" At the conclusion of each H-TBM therapy session, patients were asked about their distress post-visit on the same scale: "At the beginning of the appointment, I asked you to rate your distress this past week. What is your distress rating now?"

They were also asked to rate their satisfaction with the telehealth service delivery on a Likert-type scale (1 = not at all satisfied, 5 = completely satisfied): "How satisfied were you with the experience of using telehealth services today?" The provider was asked to reflect on their own experience with using the telehealth services and

provided a similar rating for provider satisfaction with telehealth service delivery.

In addition to the above information, providers were asked to track in the QI pilot project database, the patient's surgical status (e.g., if engaged in the transplant program), ZIP code at the time of service delivery, distance lived from MUSC, estimated travel time via Google maps, insurance type, Current Procedural Terminology (CPT) time-based insurance code that would have been billed had services been provided in person (e.g., 90832, 90834, 90837), and whether technical issues arose and if a telehealth engineer was used to assist.

Data Procedures and Analysis

All data were entered into a secure, password-protected Excel file database on a secure server that was backed up nightly; at the conclusion, the database was fully de-identified and moved to an SPSS v25 file for analysis. Descriptive analyses were conducted on patient and visit characteristics, physical distance from the hospital to the patient's residence, insurance type, and visit CPT code (i.e., length of treatment session). Paired samples *t*-tests were used to examine pre- and post-H-TBM session patient distress. Five imputed datasets were created using multiple imputation to address missing data (determined to be missing at random, with all observed variables included in imputation computation to avoid bias).[22,23] Pooled analysis values were calculated using Rubin's rules for combining parameter estimates, and standard deviations were calculated from pooled values for the standard error of the mean.[22]

Materials

Computers used by providers were standard university computers equipped with telehealth technology cameras provided by the MUSC Center for Telehealth. Patients used their own technology during H-TBM appointments (e.g., iPad, cellphone, computer). The program Vidyo (https://www.vidyo.com/), a HIPPA-compliant, real-time video conferencing platform compatible with major devices and types of Internet networks, was used.

Population

Providers

Providers (*N*=8) who participated in H-TBM visits were licensed psychologists (*n*=4) or psychology residents (*n*=4) at the time of service delivery. All possessed a PhD (*n*=7) or were in their final year of training in their PhD (*n*=1). All residents were supervised directly by a South Carolina doctoral-level licensed psychologist.

Patients

Patients (*N*=10) who participated in H-TBM visits were 33.8±14.1 years old (range 18–63 years), and all had chronic medical conditions (Table 2 includes primary condition only). In addition to chronic health diagnoses, all patients had co-morbid psychiatric diagnoses (all diagnoses reported here, thus number does not equal sample size, Table 2).

RESULTS

Phase 1: Needs Assessment for H-TBM Services

Of the patients who completed the needs assessment at outpatient BMC visits (*N*=66), most lived a great distance from the clinic, had access to the Internet and devices needed for H-TBM, and were comfortable and interested in H-TBM (Table 3). In sum, 54.4% (*n*=36) of the patients endorsed having all three types of devices (e.g., computer, tablet, smartphone), 19.7% (*n*=13) endorsed having two types, and 15.2% (*n*=10) endorsed having at least one type of device, while only 10.6% (*n*=7) denied having access to any one of these electronic devices with web-camera capabilities at home.

Table 3. Results of needs assessment, phase 1 (N =66)

Characteristic	*n* (%)
Live >50 miles from the clinic	39 (59.1%)
Have consistent access to high-speed Internet at home	58 (87.9%)
Access to personal devices at home	
• **Personal computer with web camera**	47 (71.2%)
• **iPad or tablet with web camera**	44 (66.7%)
• **Smart phone with web camera**	53 (80.3%)
• **All three types of devices**	36 (54.4%)
• **Two types of devices**	13 (19.7%)
• **One type of device**	10 (15.2%)
No access	7 (10.6%)
Comfortable using web camera on device	48 (72.7%)
Previous experience with videoconferencing	44 (66.7%)
Interested in receiving behavioral medicine service at home via H-TBM	47 (71.2%)

Phase 2: Feasibility of a Pilot Program of H-TBM Services

Patient demographics and characteristics

Twenty-four patients were screened for eligibility based on BMC provider judgment. All patients had a chronic illness, lived >50 miles from the medical center, and had access to a device supporting video conferencing and the Internet. Outcomes for eligibility screening and reasons for participation, as well as attendance for scheduled patients to their initial H-TBM visit, are summarized in Table 4. While detailed information on patients who no-showed to H-TBM initial visits is not available, of the eight patients who scheduled and did not appear for their H-TBM visits, three (37.5%) sought out mental healthcare (not specialized) locally (e.g., community mental health), two (25%) were deceased <6 months from the scheduled visit related to complications associated with end-stage organ disease, and one patient (12.5%) fell in each of the following reasons for no-show: (a) insurance problems, (b) removed from consideration for transplant by medical team, so did not want to engage in care, and (c) no data. Of note, two patients (9.5% of those scheduled) were scheduled via H-TBM, but communicated with the provider prior to the visit and requested an in-person meeting instead, and were initiated in-person care.

A total of 35 patients attended patient visits during the QI project period. Patients completed 2.8±2.3 sessions (range 1–8) via H-TBM. On average, they on average lived 157.1±40.3 miles away from the AMC, with an estimated travel time of 149.2±36.1 minutes. Twenty percent of the patients (n=2) were recipients of a solid organ transplant at the time of the H-TBM encounter, and 40% (n=4) were awaiting transplant listing.

Patient and provider results

Patient and provider satisfaction and patient distress (pre- and post-H-TBM) were examined at the visit-/encounter-level. Patients reported significantly lower acute distress (2.1±1.6) after the telemedicine sessions than they reported experiencing before the sessions (3.6±2.5; t (29) = 4.3; p < .001).

Table 4. Outcomes of eligibility screening and reasons for participation or non-participation, phase 2 (N=24)

Reasons for participation or non-participation	*n* (%)
Not scheduled for H-TBM	4 (16.7%)
• **Not interested in H-TBM**	3*
• **Excluded for cognitive concerns**	2*
• **High risk requiring in-person care**[+]	0
Scheduled for H-TBM	20 (83.3%)
• **Attended at least one H-TBM visit**	10
• **Scheduled but no-showed for H-TBM visit**	8
• **Rescheduled for in-person visit**	2

H-TBM= Home-based tele-behavioral medicine; *One patient was both not-interested and excluded for cognitive concerns; [+]High-risk refers to psychiatric severity meriting in-person care (e.g., suicidality)

Patients (4.6±0.5) and providers (4.5±0.8) were generally "satisfied to completely satisfied" with the experience of using the telehealth service. There were two visits (5.7%) where technology issues interfered with session delivery and the telehealth network engineer was engaged. In one instance, the telehealth network engineer was able to trouble-shoot, while in the second, there were unresolved issues and the remainder of the session was conducted by phone. For this second session, the provider reported being "not satisfied" due to technology problems that occurred during the delivery. The remainder of responses were "satisfied to completely satisfied" for providers, and all patients fell in this range for all visits.

Descriptive analyses examined CPT codes/length of encounter and primary insurance type at the encounter-level. Of the encounters, CPT codes/length of encounters were: 11.3% (*n*=4) 90832/30 minutes; 80% (*n*=28) 90834/45 minutes; and 8.6% (*n*=3) 90837/60 minutes. Of the encounters, 57.1% (*n*=20) were commercial insurances (e.g., Blue Cross/Blue Shield), 20% (*n*=7) were Medicaid, and 22.9% (*n*=8) were Medicare.

DISCUSSION

Results from this pilot QI project establish preliminary acceptance of and feasibility for H-TBM in this group of highly medically complex patients. Results demonstrate patient interest, need, and acceptance of receiving psychotherapy via H-TBM. A majority of patients had the needed access, comfort, and experience with technology. For the patients who were screened in phase 2, most were interested in participating in H-TBM sessions (87.5%) and chose to schedule an H-TBM visit after discussion with their provider. Results were encouraging for the initial feasibility of a clinical H-TBM program and allowed for the BMC to develop program procedures to support sustainability for H-TBM services.

The patients in this pilot had serious chronic medical conditions and co-occurring psychiatric diagnoses. Although not all who participated were pre- or post-transplant patients, 20% of the patients participating were recipients of a solid organ transplant at the time of the initial H-TBM encounter, and 40% were awaiting transplant listing, which speaks for the medical complexity of the population

served. These patients, in particular, may benefit from H-TBM as an alternative to in-person psychotherapy to manage psychosocial complications associated with chronic disease, or to prepare for intensive medical interventions, such as solid organ transplant. Importantly, the patients in this pilot lived far (157 miles) from the specialty BMC and would have had to travel, on average, almost 2.5 hours one-way (5 hours roundtrip) for an in-person visit. For patients experiencing serious physical complications of their medical conditions, this can be an arduous travel and a financial burden. Home-based TBM has the potential to reduce this burden, while simultaneously increasing access to specialty care that is not locally available. Patients reported satisfaction with H-TBM service delivery and reported decreased distress after their H-TBM visit.

While not formally assessed, patients shared with providers that it was a relief to be seen at home and avoid a long trip amidst serious medical symptom exacerbation. Providers were also generally satisfied, and were able to integrate the technology and visits easily into their daily, busy clinical practice. Technology concerns were minimal, though present.

In this study, despite the fact that H-TBM removed the barrier of transportation and its associated cost, follow-up was not ubiquitous for all patients, with 38% not showing up for their initial H-TBM visit. Research studies on attendance rates for telemedicine-delivered services in centers suggest mixed results; our results from a clinical pilot program highlighted some challenges in the implementation of H-TBM.[15] Unfortunately, we were unable to explore the detailed reasons for no-shows. Nonparticipation may have been due to the same reasons that patients no-show in clinic visits, with physical illness perhaps being a higher degree of concern in this medically complex population (e.g., 25% in the no-show group died due to complications of their disease within 6 months of the scheduled visit). Other works examining rates of nonattendance for psychotherapy have suggested that medical and physical illness is the most frequent reason for nonattendance in outpatient psychotherapy settings due to symptom burden or urgent medical visits.[24] These concerns warrant further exploration in future work examining H-TBM implementation in medically complex populations.

While this sample was particularly complex, behavioral medicine interventions, such as cognitive behavioral therapy (CBT), are also beneficial for patients with medical conditions (e.g., pain, diabetes) without co-occurring psychiatric conditions; H-TBM services may also be appropriate for these patients.[25,26,27] In the behavioral medicine literature, there has been research on different types of Internet-delivered intervention services (e.g., therapist-delivered, self-guided, center-based synchronous telehealth) for those with chronic medical conditions, though not on home-based psychotherapy.[17,28,29] Future research on the efficacy and effectiveness of H-TBM for both medical/psychiatric and medical concerns is warranted.

Part of this this pilot project involved the development of education resources for both the provider conducting H-TBM and the patient receiving H-TBM, which is supportive for the sustainability of this service within the clinic. Sessions were 45 minutes in length on average, and the payer mix was generally comparable to what is observed in the clinic for in-person visits which also bodes well for sustainability, although no insurance reimbursement was available for H-TBM mental health services at the time of service delivery.

This project raised some important questions for future practice and sustainability. The primary limitation related to long-term sustainability was the inability to continue services past the point of the pilot due to lack of insurance reimbursement in South Carolina. This also prevented the ability to track long-term psychological or medical outcomes for ongoing services. Future feasibility studies should delve further into the financial considerations of H-TBM.

Limitations of this project include small sample size, limited generalizability, and the inability to track patient progress over time. As this was a fully clinical pilot in a particular BMC, patients were selected for screening to be eligible for services (phase 2) by provider clinical judgment. This disallowed for tracking patients who were not considered in the first place based on provider discretion. The sample was selective in nature: patients were screened out if they endorsed specific risk factors (e.g., suicidality) and self-selected in, if they were interested. Patients living outside of South Carolina but traveling to the AMC for their care were excluded, due to licensing restrictions on providing telemedicine services when a patient is physically out of state.

This project was tailored to the BMC's population; therefore, findings may not be generalizable outside of this clinic and set of providers. Also, as the two phases were distinct and the needs assessment was anonymous, we were unable to link patients who may have participated in both phases. Future studies should engage a larger sample of participants and include a control arm (e.g., in-person care) to allow for comparisons between H-TBM and standard of care.

Further, inclusion of long-term clinical outcomes examining symptom improvement on formal evidence-based assessment measures and medical variables (e.g., successful transplant) may be a valuable direction for future research projects examining H-TBM with medically complex patients. Including qualitative data collection with patients to understand their perspectives on whether technology afforded the same opportunities as an in-person visit would also enhance future studies.

Overall, this study makes an important contribution to understanding the feasibility and acceptability of H-TBM for medically complex patients who might otherwise be unable to receive such specialized services. While this is a small project, the results are encouraging, and the BMC is committed to continuing this work in both clinical and research endeavors. Offering H-TBM for psychotherapy may be a valuable alternative to in-person clinic visits and may decrease patient distress and burden, thereby improving physical health outcomes by way of reduced psychosocial burden; all are areas for future investigation.

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Appendix A: Telehealth needs assessment patient questionnaire

Please help us gather some information that will help us improve how we deliver services. Your identity and responses will be kept anonymous.

Circle one response for each question.

What are you here for today?		
Pre-Transplant Evaluation	Pre-Bariatric Evaluation	General Initial Appointment
Pre-Pancreatectomy Evaluation	Spinal Stimulator Evaluation	Med Check
Individual Therapy	Group Therapy	Other:_____

Do you live greater than 50 miles from MUSC?	**No**	**Yes**
Do you have consistent access to a high-speed Internet connection at home (Wifi)?	**No**	**Yes**
Do you have access to a personal computer with web-camera capabilities at home?	**No**	**Yes**
Do you have access to an iPad or other tablet with web-camera capabilities at home?	**No**	**Yes**
Do you have access to a smart phone (e.g., iPhone, Android, etc.) with web-camera capabilities at home?	**No**	**Yes**
Do you feel comfortable using the web camera on your electronic device(s)?	**No**	**Yes**
Have you ever used Skype, Facetime, or any other real-time videoconferencing program?	**No**	**Yes**
Would you be interested in the possibility of receiving your mental health services in the comfort of your own home (tele-health)?	**No**	**Yes**

Please give this form to the receptionist when completed.

Thank you for your responses!

Appendix B: Telehealth appropriateness checklist for providers: *Is your patient a candidate?*

PART A:		
1. Does this patient have a chronic medical condition (pre-/post-surgical, end-stage organ disease, etc.)?	YES	NO
2. Does this patient live over 50 miles from MUSC, and in SC?	YES	NO
3. Does this patient have access to a device that supports videoconferencing? (e.g., Computer, IPad, Smartphone)	YES	NO
4. Does this patient have access to the Internet?	YES	NO
5. Is the patient interested in telehealth services?	YES	NO
If responses are "yes" to **PART A** questions, then the patient *may* be eligible for telehealth services. Please complete the questions below.		
PART B:		
6. Does this patient have a cognitive disorder?	YES	NO
7. Is this patient actively suicidal or otherwise high risk (history of violence, recent homicidal ideation, etc.)?	YES	NO
8. Does this patient have a psychotic disorder?	YES	NO
9. Does this patient need close monitoring for abstinence from substances?	YES	NO
If any responses are "yes" to **PART B** questions, this patient is likely more appropriate for in-person services rather than telehealth.		

Appendix C: Information reviewed with patients at the initial H-TBM visit

1. Confirmation of identity of patient and provider (showing credentials on the screen)
2. Confidentiality (use of secure and HIPPA-compliant videoconferencing platform)
3. That the patient was responsible for maintaining privacy at the originating site
4. A plan for disconnections or bad connections (provider to call patient by phone to troubleshoot)
5. Warning around wireless device charges (patients are responsible for data charges, and were encouraged to connect via WIFI to avoid data charges)
6. Review and confirmation of safety and emergency contacts and procedures
7. Information gathered each visit (satisfaction, distress) for the QI project