



Potential Benefits of Remote Continuous Care for Depression

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ABSTRACT

Depression is a burdensome and costly disease. Treatment is not sought by over half of depressed patients, and many who suffer remain depressed despite treatment. Furthermore, there is no single treatment efficacious for all patients, with optimal outcomes precluded by access, adherence, and patient satisfaction issues. The recent proliferation of telehealth solutions has increased access to care, especially during the COVID pandemic, but problems with several of its traditional types of delivery models still exist. Rather than the provision of traditional episodic mental health care, creative mental health solutions that can provide continuous care with frequent patient-provider interactions are urgently needed. This Perspective explores how digital health solutions enable the provision of continuous types of remote care to provide relief for some of the access and capacity problems exacerbated by requirements for face-to-face types of care.



PERSPECTIVES



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Depression has become one of the most burdensome diseases in the world in terms of societal and financial costs [1–5]. Since the COVID-19 global pandemic began in 2020, reports have indicated upwards trends, with one finding more than a 3-fold increase in the prevalence of depression symptoms [6]. In light of these increases and the mental health effects of prolonged periods of social isolation [7], quick access to effective depression care is critically important.

Myriad challenges have led to poor outcomes when treating depression. For one, there is no definitive type of standard depression care, with some guidelines recommending psychotherapy and others naming pharmacotherapy as first-line depression agents [8–10]. Recent meta-analyses have indicated less-than-optimal response rates of 41% for psychotherapy [11] and no significant differences in response between psychotherapy and pharmacotherapy depression interventions [12]. Second, optimal outcomes have been precluded by issues with care access, adherence, and patient satisfaction, which increase dropout rates [13–16]. Some who suffer from depression know they need care but do not want others to know they are in treatment, while others do not have time to devote to treatment or even know where to go to receive services [17]. Others cite treatment costs and issues with transportation or childcare as main barriers to seeking care. When mental health care is sought, some patients have to wait weeks or even months to receive it [18–19]. And when care is finally received, many interventions do not incorporate relapse prevention techniques, which can reduce long-term sustainability of any treatment gains [20–23]. Finally, many pharmacotherapy treatments have associated side effects such as sleep issues, weight changes, eating difficulties, pain, and sexual functioning problems [24] that negatively affect adherence and, ultimately, increase drop-out rates [25–26].

The recent proliferation of telehealth solutions has provided options to brick-and-mortar facilities, especially during the COVID pandemic when stay-at-home orders reduced the ability to have in-person visits [27–28]. These interventions combat one barrier to care—stigma—by allowing for discreet treatment that can reduce feelings of shame associated with seeking care. Some of these telehealth solutions, however, still rely on face-to-face patient-provider interactions. For example, some telehealth visits involve synchronous care via meeting with either a primary care provider (PCP) or a specialty mental health provider where either face-to-face therapy or a prescription for antidepressants (or both) is provided. While helping to solve an important remote access issue during times when in-person visits cannot occur, these types of synchronous telehealth visits still only provide *episodic* treatment in the current healthcare environment. This type of face-to-face telehealth visit provides care at scheduled appointment

times but fails to allow for easy between-appointment monitoring of symptom improvement and, for those on antidepressants, side effect onset or worsening without scheduling and attending another episodic appointment. There is a potential for patients treated by telehealth face-to-face PCPs or specialty mental health providers to struggle in the weeks or months between visits without any provider awareness.

Digital health is one feasible way to deliver mental health solutions that allow for enhanced access to frequent patient-provider interactions [29]. Rather than providing care only at scheduled appointment times, the interactions can happen more continuously whenever the need arises. This is particularly true for asynchronous solutions. In these types of interventions, patients can complete various online exercises (e.g., psychoeducational lessons with questions posed to the patient, meditation or biofeedback practices, etc.) and the therapist can provide written feedback on those exercises. Then, the patient can read the therapist's messages when convenient and, if needed, return a message back to the therapist.

Although all types of digital solutions may solve access issues, these types of continuous, asynchronous solutions also have the potential to relieve some of the capacity problems exacerbated by face-to-face types of care. Digital interventions that employ asynchronous care also can efficiently address capacity issues faced in many areas of the U.S that suffer from shortages in mental health providers and might reduce the burden felt by primary care providers (PCPs) who often have to treat patients with mental health issues themselves [30–31]. Although some argue that digital solutions might increase the number of depressed patients accessing care and thus raise the amount of overall mental health spending, effective digital strategies that move patients from being depressed to not depressed could lead to more than \$6000 per patient per year in total healthcare expenditure savings [32–33]. Even digital interventions supported in some ways by trained mental health providers can be scalable and cost-effective with careful considerations to automating portions of the treatment asynchronously and reducing the time-per-patient to a minimally adequate level.

Quite strikingly, supported digital mental health solutions provide opportunities to “touch” the patient on a frequent basis that are not afforded in the current structure of face-to-face episodic mental health care, even that provided by telehealth. This model of continuous care takes the merits of the supportive accountability model [34]—in which human support provides patients with a “check-in,”—one step further. In contrast to the traditional episodic model, albeit in-person or delivered via telehealth, continuous care provided by supportive therapists may improve rates of program completion and engagement and, thus,

lead to better clinical outcomes [35]. A review of digital mental health interventions found dropout rates lower for therapist-supported (TS; 28%) and administrative-supported (AS; 38.4%) treatments as compared with non-supported (NS; 74%) treatments [36].

In addition, adherence to and patient satisfaction with supported digital mental health interventions appears high, although many digital health intervention trials fail to report these metrics [37]. One therapist-supported digital health intervention that provides this model of “continuous care” asynchronously reports that patients with at least moderate depressive symptom scores at baseline (PHQ-9 ≥ 10) engage with the program an average of 3.9 days per week during their 8- to 12-week program and that only about 19.6% drop out [38]. Patients in this model of care get immediate feedback in real time—they don’t have to wait to see their mental health provider for weeks or months to check-in with them and discuss strategies that are working and what aspects require more attention. Despite the remote provision of care, the therapeutic alliance created is robust and at least as strong as that provided by interventions delivered face-to-face [39].

These gains in adherence and satisfaction translate to improvements in outcomes. A review of digital mental health interventions found significantly better between-group effect sizes for therapist-supported (TS) treatments ($d = 0.78$) and administrative-supported (AS) treatments ($d = 0.58$) than non-supported (NS) treatments ($d = 0.36$) [36]. Considering these effect sizes in light of real-world psychotherapy and pharmacotherapy studies, with response (defined as at least 50% reduction in symptoms) rates of 36% at 24-week follow-up in one study of adult depressed patients treated by psychiatrists [40] and, in another study, of 25.4% response at 6-month follow-up among public sector depressed outpatients treated by a medication algorithm [41] strengthens the case for preferential use of a continuous care model afforded by digital health solutions.

The continuous care aspect of digital mental health interventions also provides real-time data that patients want [42] and providers can use to monitor patient symptoms and provide timely feedback to increase the likelihood of having a good outcome. This method of data collection also allows providers to quickly respond to common safety issues—like deteriorating mental health, suicidality, and onset of psychotic symptoms during the intervention [43]. As the future of medicine becomes more empowered by digital tools and solutions, data collected via digital interventions can be analyzed using cutting edge methodologies. For example, recent advances in artificial intelligence methods including machine learning tools and techniques and natural language processing may lead to early detection of behavioral patterns that could improve outcomes via the ability to individualize and personalize key components of the intervention [44]. Methods being used in several

ground-breaking efforts to develop predictive models that detect occurrences of suicide attempt [45], the onset of psychosis [46], and violent behaviors [47] from analyses of speech and written text can be applied to improving depression care with data collected by app-based interventions.

More rigorous studies such as well-designed randomized controlled trials are critically needed [29]. For example, a head-to-head study that compares the efficacy of supported digital health interventions that provide continuous care and more traditional, episodic types of care such as face-to-face therapy and/or pharmacotherapy would illuminate differences between care types. These studies should employ well-known, reliable symptom measures such as the Patient Health Questionnaire-9 item scale [48] as well as diagnostic information from semi-structured clinical interviews such as the Mini International Neuropsychiatric Interview (MINI) [49]. Ideally, additional studies that compare interventions systematically are needed to calculate whether the digital health solutions affect the number able to initiate treatment, to help understand how patient-provider interactions may impact completion rates, and to determine cost-effectiveness [50]. Now, more than ever in our post-pandemic world filled with the aftereffects of social isolation, we need to embrace supported digital depression interventions that enable the delivery of continuous care and devote our resources towards developing them.

COMPETING INTERESTS

Dr. Forman-Hoffman is employed as the Chief Research Officer at Meru Health, Inc., receives salary from the company and owns options of the company. Dr. Kvedar is on the Advisory Boards of LuminDx (also owns stock) and Res App Health (also owns stock and draws consulting fees), Flare Capital, and Good Rx, serves as a consultant and draws a consultant fee from Boston Microfluidics, and owns stock in MD Revolution, b.well (also serves on Board of Directors), MobileHelp (also serves on Board of Directors), NuRx (also draws a consulting fee and serves on a board sub-committee) and FDNA (also serves as an advisor). Mr. Ranta serves as the Chief Executive Officer (CEO) at Meru Health, Inc., owns a large share of stocks, and raises salary from the company.

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