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Cognitive and Behavioral Practice xx (2014) xxx-xxx

**Cognitive and  
Behavioral  
Practice**
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## Pilot Open Case Series of Voice over Internet Protocol-Delivered Assessment and Behavior Therapy for Chronic Tic Disorders

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*Comprehensive Behavioral Intervention for Tics (CBIT) is an efficacious treatment for children with chronic tic disorders (CTDs). Nevertheless, many families of children with CTDs are unable to access CBIT due to a lack of adequately trained treatment providers, time commitment, and travel distance. This study established the interrater reliability between in-person and Voice over Internet Protocol (VoIP) administrations of the Yale Global Tic Severity Scale (YGTSS), and examined the preliminary efficacy, feasibility, and acceptability of VoIP-delivered CBIT for reducing tics in children with CTDs in an open case series. Across in-person and VoIP administrations of the YGTSS, results showed mean agreement of 91%, 96%, and 95% for motor, phonic, and total tic severity subscales. In the pilot feasibility study, 4 children received 8 weekly sessions of CBIT via VoIP and were assessed at pre- and posttreatment by an independent evaluator. Results showed a 29.44% decrease in clinician-rated tic severity from pre- to posttreatment on the YGTSS. Two of the 4 patients were considered treatment responders at posttreatment, using Clinical Global Impressions-Improvement ratings. Therapeutic alliance, parent and child treatment satisfaction, and videoconferencing satisfaction ratings were high. CBIT was considered feasible to implement via VoIP, although further testing is recommended.*

**C**HRONIC tic disorders (CTDs), including Tourette Syndrome (TS) involve sudden, repetitive involuntary motor and/or vocal tics that have been present for longer than 1 year (American Psychiatric Association, 2013). CTDs are associated with impairment in physical, psychological, social, and family functioning and reduced quality of life (Conelea et al., 2011; Cooper, Robertson, & Livingston, 2003; Cutler, Murphy, Gilmour, & Heyman, 2009; Storch et al., 2007). Antipsychotic medications have typically been the first-line intervention for CTDs (Gilbert, 2006). Although moderately effective for reducing tics, they are often associated with adverse side effects that limit their clinical use, including: weight gain, sedation, cognitive dulling, depressive symptoms, and neurological side effects (e.g., tardive dyskinesia, dystonia; Scahill et al., 2006). Behavior therapy has emerged as an effective nonpharmacological treatment option for reducing tics (Cook & Blacher, 2007; Himle, Woods, Piacentini, & Walkup, 2006), and has recently been recommended as a first-line

treatment for tics in European and Canadian best-practice guidelines (Steeves et al., 2012; Verdellen et al., 2011).

Recently, several behavioral techniques, including psychoeducation, habit reversal training (HRT), function-based assessment and intervention, self-monitoring, relaxation training, and behavioral rewards (Woods et al., 2008), have been combined to create a multifaceted treatment package called Comprehensive Behavioral Intervention for Tics (CBIT). CBIT was recently compared to supportive psychotherapy and education (PST) in two separate multisite RCTs in children (Piacentini et al., 2010) and adults (Wilhelm et al., 2012). Acute treatment for both groups involved 8 sessions over 10 weeks. Results of the child study ( $n = 126$ ) demonstrated that 52.5% of the participants in the CBIT group were acute phase treatment responders, compared to 18.5% of the PST group. There were also significantly greater reductions in clinician-rated tic severity, as measured by the Yale Global Tic Severity Scale (YGTSS), in CBIT (30.8%) relative to PST (14.2%); reductions were similar in magnitude to those found in several RCTs of medications (Scahill et al., 2013). Additionally, decreases in the YGTSS impairment scores in the CBIT group (51.2%) were greater compared to PST (29.9%). Responder status was maintained through 6-month follow-up for 87% of the acute-phase CBIT responders.

*Keywords:* tic disorders; behavior therapy; voice over internet protocol; videoconferencing

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Despite the efficacy of CBIT, many families of children with CTDs are unable to access the treatment. In a recent national survey examining treatment utilization in children and adults with chronic tic disorders ( $n = 672$ ), treatment-seeking families cited several reasons for not pursuing a behavior therapy option to treat their child's tics, including little time to attend weekly therapy, a lack of treatment providers in their region, and long distances to providers (Woods, Conelea, & Himle, 2010).

One way to increase access to treatment among underserved populations is through the use of videoconferencing (VC) technologies. The traditional VC model, such as that used by Himle et al. (2012), typically involves two clinical or academic sites with specialty VC equipment connected via a dedicated high-speed connection. Although VC has been shown to be efficacious, feasible, and acceptable when used to deliver interventions for a range of psychological disorders (e.g., Capner, 2000; Simpson, 2009), traditional VC has only recently been applied to CTDs. In an initial pilot study, Himle et al. (2010) delivered CBIT via VC to three children with TS and found that all three showed significant reductions in tic severity (Himle et al., 2010). In a follow-up study, Himle et al. (2012) randomly assigned 20 children to receive CBIT delivered either via VC or traditional face-to-face delivery. Results showed significant pre to post reductions in clinician-rated tic severity (YGTSS) in both groups, with mean reductions of 33% and 27% for VC and face-to-face groups, respectively. No significant differences in mean reductions were found between groups. Benchmarking results against findings in the original CBIT study, reductions in tic severity were similar when using VC format. Additionally, both treatment modalities were rated as highly acceptable by parents and children, with no significant differences between groups. There were also no significant differences in parent and child-reported therapeutic alliance between groups (Himle et al., 2012).

Despite its growing popularity, the traditional VC delivery model fails to address several important accessibility barriers. Treatment may be restricted to the locations where the equipment is installed and typically requires patients, and sometimes the therapist, to travel to a dedicated site to use the equipment. Another limitation is that the traditional VC model often requires the support of specially trained personnel at both VC sites to maintain the equipment, assist the therapist and client in connecting and using the equipment, and to provide logistical support to the patient (Hilty, Luo, Morache, & Nesbitt, 2002; Simpson, Bell, Knox, & Mitchell, 2005). Such reliance on support resources not only increases the cost of treatment, but also poses logistical barriers that may limit adoption of VC to deliver care.

A newer alternative to traditional VC delivery is the use of Voice over Internet Protocol (VoIP) telephony or

web-based VC (e.g., Skype). This technology allows users to connect over the Internet through software using wired or wireless high-speed connections and a basic web camera. Delivering CBIT via web-based VC has several potential advantages over traditional VC delivery. First, it benefits patients, as services may be received from their own home computers, reducing costs, and potentially decreasing time missed from work and school to attend appointments. Second, a web camera is a lower cost alternative to the equipment needed for traditional VC. Third, web-based VC benefits clinicians, as they may be able to work directly from their office or be otherwise freed from the constraints posed by the physical stability of traditional VC equipment. Lastly, another advantage is that VoIP allows patients broader, direct access to experts in a particular treatment or field. Although both traditional VC and VoIP delivery provide access to treatment for those who live far away from knowledgeable treatment providers, traditional VC typically requires patients to drive to the nearest clinic that houses the equipment for treatment.

Despite the potential of VoIP to increase access to treatment, there are potential limitations. Specifically, call quality and reliability are highly dependent on the type and speed of the Internet connection (Kazemitabar, Ahmed, Said, & Habsullah, 2010) and may be influenced by certain computer specifications, including processor speed, random access memory, and hard drive disk space (Ramirez, 2011). Additionally, external technical support may not be readily available, particularly for consumers using VoIP in their homes. There is some research assessing the efficacy and feasibility of VoIP-delivered treatment, with promising findings. VoIP treatments for insomnia (Lichstein, Scogin, Thomas, DiNapoli, Dillon, & McFadden, 2013), social phobia (Yuen et al., 2013), OCD (Storch et al., 2011), substance abuse (King, Brooner, Peirce, Kolodner, & Kidorf, 2014), and depression in older adults (Choi et al., 2014a; Choi, Wilson, Sirrianni, Marinucci, & Hegel, 2014b) have been associated with significant decreases in target symptoms. Additionally, high satisfaction (Choi et al., 2014a; King et al., 2014; Storch et al.; Yuen et al.) and a strong therapeutic alliance (King et al.; Lichstein et al., 2013; Yuen et al., 2013) have been observed. With respect to feasibility, patients have found the modality to be convenient, but technical difficulties (Choi et al., 2014b; King et al., 2014; Lichstein et al., 2013; Yuen et al., 2013) and challenges reading body language (Lichstein et al., 2013; Storch et al., 2011) are common. Despite preliminary evidence, research on the efficacy and feasibility of VoIP-delivered therapy is still rather limited; and the validity and reliability of administering clinician-rated measures via this modality have yet to be assessed. Therefore, two studies were performed as part of research testing the feasibility of using VoIP to assess and treat CTD in children.

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