Comprehensive Behavioral Intervention for Tics

A practical review for clinicians.

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This review provides an introduction to the epidemiology, common comorbidities, suspected etiologies, and therapies of tic disorders including Tourette syndrome (TS). We focus on habit reversal therapy (HRT), and its extension, comprehensive behavioral intervention for tics (CBIT), with emphasis on the evidence-based nature of these therapies as first-line treatment. Core CBIT components (psychoeducation, function-based environmental interventions, HRT, and relaxation training) and ideal candidates for CBIT are discussed. Finally, we review ways to access CBIT, barriers to seeking treatment, and new delivery methods including telehealth and the use of paraprofessionals.

Epidemiology

Tics are sudden rapid recurrent nonrhythmic movements or vocalizations.[1] The American Psychiatric Association Diagnostic and Statistical Manual-5 (DSM-5) includes 3 primary types of tic disorders. These are TS, characterized by multiple motor tics and 1 or more vocal tic(s) for at least 1 year; persistent tic disorder with the presence of only 1 category of tics for at least 1 year; and provisional tic disorder when tics are present for less than 1 year.[1] Tic disorders typically present in childhood with an average age of onset between 5 and 7 years.[2] Tics are relatively common with prevalence rates of transient tics ranging from 8 to 40 per 1,000 and TS ranging from 4 to 10 cases per 1,000 in school-aged children.[3] Tics typically peak in severity during late childhood or early adolescence with a marked reduction in tic severity reported by early adulthood in two-thirds of cases.[4,5] Sex differences exist with tic disorders being more common in boys.[3,6,7] Several psychiatric comorbidities are frequently observed in individuals with tic disorders. Between 26% and 60% of children with TS meet criteria for attention deficit hyperactivity disorder and 33% to 50% meet the criteria for obsessive-compulsive disorder (OCD).[3,4] Additional common comorbidities include learning disorders, depression, anxiety, and disruptive behaviors.[3,8] Individuals with tic disorders are also more likely to experience social impairment, educational/vocational impairment, and decreased quality of life.[9,10]

Clinical Presentation

Tics are often heterogeneous in presentation. Common tics include eye blinking, head jerking, sniffing, and throat clearing. Although coprolalia, defined as saying obscene words or socially inappropriate statements, is often associated with TS in media portrayals, this feature affects only 10% to15% of people with TS.[2,11] Despite variation in symptom presentation across individuals, some common clinical features exist. A hallmark of tic disorders is the tendency for tics to vacillate in frequency and severity.[2,3] Tics are also susceptible to influence from the environment, often worsening under certain conditions. Finally, many people with tic disorders endorse premonitory urges where they experience a feeling or sensation (eg, itch, tension, or pressure) prior to engaging in a tic which is relieved after the tic is performed.[2] Individuals with TS often describe this urge as unpleasant and more bothersome than actual tics.[2]

Etiology

Although the underlying cause of tic disorders remains unknown, several suspected etiologies have been proposed. Considerable research suggests that genetic factors contribute to risk for tic disorders. The relative risk of TS is 10 to100 times greater for individuals with first-degree relatives diagnosed with TS, and twin studies show higher concordance rates among monozygotic compared with dizygotic twins.[12] Additional research supports structural differences in the brains of individuals with tic disorders involving the basal ganglia, particularly the striatum.[7,8] Neurochemical differences also exist in individuals diagnosed with tic disorders; dopamine has long been considered the primary trans-

mitter implicated in tics, but recent studies suggest that glutamate, GABA, serotonin, and norepinephrine may also play roles in symptom presentation.[2,7] Despite evidence for biological underpinnings of tic disorders, a singular etiology has yet to be identified.

Behavioral Therapies vs Medication

Although there is no cure for tic disorders, symptom reduction can be achieved with treatment.[9] Historically, medications have been considered first-line treatment for tics, with antipsychotics used most commonly. Medications can be beneficial but also have significant side effects, particularly antipsychotics.[7] Behavioral therapy offers an alternative to medication under the premise that, although tics are neurologic, internal and external triggers can affect tic frequency.[2,9,13,14] Behavioral therapy addresses those internal (ie, the premonitory urge) and external (eg, task avoidance) triggers directly to provide symptom relief.[2,14] Different types of behavioral therapy have been investigated with compelling evidence for HRT, and the newest extension of this treatment, CBIT, as the most effective therapy.[9,13-15]

Habit Reversal Therapy

First developed to treat habits (eg, nail biting and head shaking),[16] HRT consists of awareness training, competing response (CR) practice, social support procedures, and generalization training. In the initial study of HRT, there was a 90% reduction in habits that were treated.[16] Subsequent studies, including randomized controlled trials, reported excellent outcomes for HRT vs most other behavioral therapy with sustained improvement.[6,9,13,14]

Comprehensive Behavioral Intervention for Tics

As a manualized approach, CBIT adds psychoeducation, function-based assessment, and behavioral incentives to the aforementioned components of HRT.[2,13,17] In a randomized controlled trial of CBIT vs supportive therapy for children with tics, 52% of participants treated with CBIT responded and maintained improvements at 6-months follow-up.[18] In a study with adult participants, more than 38% of those treated with CBIT were responders with similar maintenance of treatment gains.[17] Similar results have since been seen in additional randomized controlled trials.[19] The preponderance of evidence shows CBIT is as effective as antipsychotic medication in reducing tics, with moderate-to-large effect sizes and a more favorable side-effect profile.[6,19,20]

In light of the strong evidence for CBIT, European and Canadian guidelines in 2011 and 2012, respectively, stated that CBIT should be first-line treatment for individuals with tics.[13,21] It is recommended that CBIT, when available, be offered as an initial treatment option relative to other behavioral therapies and medication.[20]

Comprehensive Behavioral Intervention for Tics Program Content

There are 2 primary phases of CBIT including 8 weekly primary sessions followed by 3 or more periodic booster sessions to maintain treatment gains.[2] Length of treatment varies depending on individual factors (eg, number of bothersome tics). Primarily suited for children, CBIT can be used in adults with minor modifications. For children, sessions are completed jointly with primary caregiver(s). Treatment for adolescents may be completed individually with families included as needed for education and support.

There are 4 primary treatment components of CBIT: psychoeducation, HRT, function-based environmental intervention, and relaxation training.[2] These are delivered in a complementary fashion over the course of treatment (Table 1).

Psychoeducation

Psychoeducation at the outset of treatment typically includes information on diagnosis and etiology. It is often necessary to revisit and discuss this information throughout the course of treatment.[2]

Function-based Environmental Intervention

Function-based environmental interventions identify and modify factors that exacerbate tics or increase impairment(s). These factors can be divided into antecedents (occur before tics) and consequences (occur in reaction to tics, such as teasing, being comforted, or being asked to leave the classroom). Antecedents may be internal phenomena (eg, anxiety or excitement) or external events including particular settings (eg, certain classes or meeting new people).[2,13] A function-based assessment identifies these factors through interviews with the child and family and self-monitoring between sessions.

Once identified, interventions are developed for each antecedent and consequence. Antecedent interventions may include educating others about tics, breaking down tasks that exacerbate tics into smaller components, or scheduling activities during a time of day when tics happen less frequently. Some examples of consequence interventions are encouraging others to ignore tics or encouraging the child to persist in activities despite tics. Short tic breaks may be helpful but should not result in avoidance of activity because this may exacerbate tics.

Habit Reversal Training

The primary components of HRT incorporated in CBIT are awareness and CR training. Awareness training aims to increase recognition of when a tic happens or is about to in order to facilitate the implementation of a CR. Awareness training during sessions involves thoroughly describing and practicing the recognition of tics and premonitory urges.

TABLE 1. COMPREHENSIVE BEHAVIORAL INTERVENTION FOR TICS PROGRAM CONTENT	
Week 1 Session 1	Psychoeducation on tic disorders
	Development of a behavioral reward program
	Introduction to function-based interventions
	Develop a hierarchy of tics to address in treatment
Week 2 Session 2	Review tic hierarchy
	Enhance motivation by listing reasons tics are inconvenient
	Develop function-based interventions for first tic
	Awareness training and develop a competing response (CR) for first tic
	Review behavioral reward program
Week 3 Session 3	Review tic hierarchy
	Inconvenience review
	Develop function-based interventions for second tic
	Awareness training and develop a CR for second tic
	Review behavioral reward program
Week 4 Session 4	Review tic hierarchy and inconveniences
	Develop function-based interventions for third tic
	Awareness training and develop a CR for third tic
	Introduce and practice diaphragmatic breathing
	Review behavioral reward program
Week 5 Session 5	Review tic hierarchy
	Inconvenience review
	Develop function-based interventions for fourth tic
	Awareness training and develop a CR for fourth tic
	Introduce and practice progressive muscle relaxation
	Review behavioral reward program
Week 6 Session 6	Review tic hierarchy
	Inconvenience review
	Develop function-based interventions for fifth tic
	Awareness training and develop a CR for fifth tic
	Review relaxation skills
	Review behavioral reward program
Week 7 Session 7	Review tic hierarchy
	Inconvenience review
	Develop function-based interventions for sixth tic
	Awareness training and develop a CR for sixth tic
	Introduce relapse prevention
	Review behavioral reward program
Week 8 Session 8	Review tic hierarchy
	Inconvenience review
	Review treatment procedures
	Discuss strategies for relapse prevention
	Review behavioral reward program
Weeks 12-20 Sessions 9-11	Review tic hierarchy
	Inconvenience review
	Review previous treatment content
	Review behavioral reward program

Following awareness training, the child begins CR training, which involves learning a behavior to perform when a premonitory urge or tic starts. A CR should be a behavior that is either physically incompatible with the tic or a more subtle variation of the tic. For example, if a child has a shoulder raising tic, an incompatible behavior might be holding the shoulders down and back. For motor tics, CRs are typically alternate movements, whereas CRs for vocal tics involve changing breathing patterns. After identifying an appropriate CR, these skills are practiced in therapy sessions to prepare for use whenever tics or premonitory urges occur. It is helpful, especially for younger children, to identify a support person to encourage and reinforce consistent use of CRs.[2]

Relaxation Training

Children also receive instruction in diaphragmatic breathing and progressive muscle relaxation. These can help reduce some of the stress or tension created by tics and may also be helpful during times of increased anxiety, excitement, or stress, which can exacerbate tics.[2]

Reward Programs

Behavioral reward programs assist in motivating the child to participate in sessions, encourage home practice, and increase overall adherence. Reward systems are developed collaboratively with the child and family. Target behaviors include session attendance, homework completion, and session activity participation. It is important that opportunities to earn rewards are based on adherence to treatment, not tic reduction; in other words, the effort is rewarded rather than the result.

Candidates

Individual factors that improve or attenuate treatment success are generally understudied, but some useful patterns have emerged. Designed for individuals age 9 years or more, CBIT is most effective when participants are motivated, aware of their tics and associated premonitory urges, and cognitively able to fully engage in therapy. Although robust evidence to recommend behavioral interventions in younger children is generally lacking, recent guidance suggests CBIT may be effective in this population.[20] Likewise, it is unclear if CBIT is effective for children with cognitive limitations, because most studies excluded participants with cognitive impairments.[2,6,10,15,17,18,20]

Concerns and Barriers to Treatment

Despite recommendations for behavioral therapy as first-line treatment, many children do not have access to it. Families and providers may also be hesitant to pursue or recommend behavioral therapy because of misunderstandings regarding safety, fear of worsening of tics, and concern for a potential rebound effect.

Safety and Tolerability. Both landmark studies of CBIT found participants were no more likely to have adverse events, require increased medication dosing, or experience worsening psychiatric symptoms compared with those who received supportive therapy.[17,18] Studies observed low attrition rates, suggesting that although participation in therapy requires more effort than taking medicine, behavioral treatment is well-tolerated by children and families.[21]

Tic Worsening. Although tics can increase during conversations about tics, they generally subside back to baseline levels when the topic shifts, arguing against a worsening of tics resulting from behavioral therapy.[13] Research also shows clinician-guided self-monitoring and awareness training has a beneficial effect on tics.[13,14] The preponderance of evidence provides no support for worsening of tics after a typical course of CBIT.[17,18,21]

Symptom Substitution. Symptom substitution is the notion that if 1 tic is treated another will emerge or a comorbid psychiatric symptom will increase. This is rooted in psychodynamic theory and clinical anecdotes, but there is no empiric evidence to support this hypothesis, whereas behavioral therapy has been shown to decrease tics and comorbid psychiatric symptoms.[9,10,13,14,16,19]

Rebound Effects. A study of neurologists and psychologists found that 77.4% believed that suppression of tics increases tics over and above the natural baseline, termed the rebound effect.[22] This has been tested experimentally, however, and evidence is consistent that suppression does not result in a rebound effect.[13,14,18]

Awareness. An additional barrier to CBIT appears to be a lack of awareness of behavioral treatments for tic disorders. In a study examining the use of behavioral therapy in community samples, the top 2 reasons for not accessing CBIT were that families had not heard of it and did not know how to access it.[5] Many providers treating TS are also unaware of behavioral therapy for tics, with only 14.3% of physicians and 31.3% of psychologists having heard of HRT in a 2004 survey study.[22]

Shortage of Trained Providers. Even when there is interest in pursuing CBIT, it is difficult to find trained providers.[15,23] Use of telehealth for delivery of CBIT via video or internet conference has been investigated and shows similar efficacy to in-person CBIT.[23,24] Thus, telehealth could increase access to CBIT, although the number of trained therapists is still too low to meet the needs of the population of people with tics. Telehealth also does not address the time commitment needed for CBIT or the expense of participating in treatment. To further increase the number of CBIT providers, studies investigated training paraprofessionals and found that master's level clinicians, occupational therapists, and nurse practitioners can effectively deliver CBIT.[24,25] Table 2 summarizes methods to access CBIT.

To address the need for trained providers and accessibility, TicHelper, a web-based interactive self-help program based on the CBIT protocol was created.[15] It is a family-based program recommended for children age 8 years or more that includes parent skills training. TicHelper is designed to be completed in 8 weeks, with approximately 30 to 60 minutes of website activity and practice per day. This program contains 4 modules paralleling CBIT modules, including tic education, reducing tic triggers, tic awareness, and tic blocking. Although TicHelper shows promise in reducing some of the burdens in accessing treatment, research data regarding efficacy is lacking and there are limitations to the program. In particular, TicHelper may not be appropriate for complex cases such as comorbid diagnoses or self-injurious tics. Although TicHelper allows for individualization, administering treatment without a therapist limits the customizability of CRs and would not identify tics a child does not explicitly endorse. The program also does not address psychosocial comorbidities that often contribute to decreased quality of life.[15]

Conclusions

Chronic tic disorders are common and impairing for children and adolescents.[3,6,7] Although tics may improve over time, many adolescents continue to experience functional impairments from tics into adulthood, making early access to treatment essential.[6,7,9,10] There is a rich evidence base for CBIT efficacy, comparable to medication with fewer side effects and maintenance of treatment gains.[6,17-20] American, Canadian, and European guidelines all recommend CBIT as first-line treatment for children and adolescents with tics.[3,20,21] However, despite the recommendation to seek behavioral therapy for tics, few children and adolescents have access.[5,15,23] Future directions include continued efforts to disseminate the evidence for CBIT, training of professionals and paraprofessionals to deliver CBIT, and continued development of alternative treatment delivery methods to improve access.[5,15,23,24] ■

TABLE 2. ACCESS TO COMPREHENSIVE BEHAVIORAL INTERVENTION FOR TICS

Modality	Websites	Further Instructions
In-person therapy	tourette.org/find-a-provider	Use the filters to search by state, age, and expertise (comprehensive behavioral intervention for tics [CBIT])
Online self-guided therapy	TicHelper.com	You can either enroll for the therapy directly or access a demonstration to see how the website functions

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Disclosures

CMS-D and HAF report no disclosures