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Tardive Dyskinesia

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TARDIVE DYSKINESIA

by

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Abstract

Tardive dyskinesia (TD) is a movement disorder that is a common side effect of antipsychotic medications used in the treatment of mental illness. The case presented in this paper is from a patient in their sixties with a long history of treatment for their mental illnesses and substance abuse. During the course of treatment, this patient developed severe TD. The literature review focused on past, current and new treatments for TD and in addition, the hypothesized causes for tardive dyskinesia. New treatments and their effectiveness may give a Psychiatric Nurse Practitioner better understanding of the cause of TD and how to treat it once it is recognized or prevent it from happening.

Background

Tardive dyskinesia (TD) is described in the Diagnostic and Statistical Manual of Mental disorders (5th ed.) (American Psychiatric Association, 2015) as choreiform or athetoid involuntary movements that occur in the face, mouth, extremities, trunk, diaphragm and pharyngeal areas. Movements must last at a minimum of a few weeks and be associated with the use of neuroleptic medication for a few months. Older people may develop symptoms of TD in a shorter period and in some persons, symptoms may present following changes, reductions or discontinuation of their neuroleptic medications. If symptoms occur following a change, reduction or discontinuation they are classified as neuroleptic withdrawal-emergent dyskinesia and typically resolve in 4-8 weeks. Movements that meet criteria for TD that persist beyond this time period are diagnosed as TD (American Psychiatric Association, 2013).

TD has the potential to be a permanent hyperkinetic involuntary movement syndrome associated with the use of dopamine receptor-blocking agents (DRBAs), classes of medications that have this mechanism of action include antipsychotics, antiemetics, tricyclics, medications for gastrointestinal disorders and others. Several management strategies are recognized for TD, none were established or standard FDA-approved until recently (Khouzam, 2015).

Until 2017, TD management consisted mainly of off-label use of medications, switching to another agent, medication discontinuation and supplements. Last year the FDA approved the first medication treatment for TD in adults (Uhlyar & Rey, 2018). This new treatment not only gives hope to individuals that suffer from TD but could also have the added benefit of reducing current medication regimens and the associated side effects.

Case Report

The client in my case report (in their 60's now) is being managed for her mental health and substance abuse disorders in an outpatient setting and was seen for routine psychiatric assessment and medication management follow up. Most recent mental health history includes Alcohol Use Disorder (Severe), Alcohol Induced Dementia and Borderline Personality Disorder. Client was recently admitted to the long-term psychiatric hospital after a relapse on alcohol, treated for less than a week and discharged to the community. Other psychiatric diagnoses include: Schizoaffective disorder (Bipolar type), Unspecified Anxiety Disorder and TD. Currently she is prescribed Trazodone at night as needed for sleep and Ingrezza for the TD.

This client has a long and extensive mental health history dating back to childhood. The client endorsed hyperactivity in childhood that lead to frequently being in trouble in the classroom due to not being able to sit still. Later in life this was discussed as symptoms either due to anxiety or ADHD. Drug and alcohol use began around the age of 16 and the client was treated for addiction at the age of 17. During the first inpatient treatment for substance abuse the first psychiatric hospitalization occurred. The client was not able to recall the circumstances leading up to the first inpatient psychiatric treatment. Historical data accuracy is unknown due to the diagnosis of alcohol induced dementia. Endorsed symptoms of her illness in the past include; multiple suicide attempts, auditory hallucinations (AH) and anxiety.

This client has had more than thirty inpatient treatments for both mental health and substance abuse going back 40 years. Prior psychiatric psychotropic medication treatment include benztropine for extrapyramidal symptoms, trazodone for sleep, bupropion for mood, quetiapine for AH, venlafaxine for mood, olanzapine for AH, hydroxyzine and clonazepam for anxiety, aripiprazole, risperidone and ziprasidone for AH, paroxetine and Depakote for mood,

fluphenazine, trifluoperazine and Thorazine for AH and Remeron for sleep. The prior medication list could be more extensive as I only had record access going back to 2015.

At the most recent follow up appointment the client denies any mood or psychotic symptoms, and reports using her Trazodone for sleep a couple times a week. This client was prescribed Ingrezza three months ago and has been taking it daily at 80 mg for about 2.5 months. Prior to the Ingrezza this client showed symptoms of severe TD including movements of the mouth, tongue and extremities per previous antipsychotic involuntary movement scales (AIMS) assessments going back to 2015. At the most recent appointment the client was scored a zero on AIMS with only minimal quivering of her mouth/lips that did not meet criteria for facial/oral movements. This was a significant change from scoring 4's (severe) in these areas in past AIMS assessments. The client's most recent relapse on alcohol is being treated with Vivitrol and therapy was recommended, substance abuse is where the individual struggles currently, after, per the client being able to abstain from use for a period of time, that was lengthy for her. No medication changes were made at her most recent psychiatric visits for medication follow up, and the client was pleased with the positive effect the Ingrezza had on the TD. She denied any adverse side effects of the medication.

This was the first case of TD treated with Ingrezza at the long-term psychiatric facility after only learning of the new treatment in recent months. A prior authorization (PA) was needed to get this medication approved by the client's insurance. Per the prescribing provider the company that produces Ingrezza made the process simple with paperwork specific for this medication available to fill out and submit to a client's insurance company. The approval was processed within the same week as the PA was sent to the insurance company. Positive results like this warrant a change in how TD is treated for any provider with clients that show symptoms

of this movement disorder. Further research based on a case study example as this, should be shared with other psychiatric providers to improve prescribing practices for neuroleptic medications.

Literature Review

History of Tardive Dyskinesia

My literature search included the data bases: PubMed, CINAHL Complete and PsychINFO using the terms “tardive dyskinesia”, “tardive dyskinesia treatment”, “tardive dyskinesia case studies”, “tardive dyskinesia differential diagnosis” and “tardive dyskinesia in patients treated with atypical antipsychotics”. Ten results were found and used that fit the criteria for this independent study. Other sources of information included the DSM-V, American Academy of Neurology and the National Institute of Health.

Antipsychotic medications (neuroleptics) were first used in the 1950’s. Their use caused a great change in the treatment of psychotic disorders. The first published report of orofacial involuntary movement that was irreversible was in 1957. This case involved treatment with the medication megaphen, a derivative of the antipsychotic phenothiazine. TD became an official term in 1964 to represent the delay in onset of symptoms of TD between antipsychotic use and abnormal movements (Khouzam, 2015). As of 1972 all antipsychotic medications began to carry the warning of TD with the packaging. The formal international definition of TD includes the classic signs of face-cheek-tongue movements referred to as the buccolingual masticatory syndrome. Movements include lip smacking, tongue thrusting or protruding, side to side jaw movements and sucking behaviors. TD movements can become more pronounced during times of stress or while moving another part of the body such as walking. The movements do not occur at all during sleep. Other uncontrolled movements of TD include choreiform of the feet and

hands, dystonia of the trunk and neck, asynchrony of the diaphragm effecting breathing and athetosis of the extremities (Khouzam, 2015).

The 1990's brought about new medications for the treatment of psychotic disorders known as second-generation antipsychotics (SGAs). There was hope this new class of medications would be an effective treatment for psychosis while carrying a lower risk for side effects such as TD. Unfortunately, this hope has diminished due to reports of this medication class's potential for causing TD along with increased risk of cerebrovascular and cardiovascular morbidity and mortality. The risk of TD is greater in the elderly population, lower doses of both first generation antipsychotics (FGAs) and SGA's should be used, and the risk/benefit analysis must be done cautiously.

Pathophysiology of TD

The pathophysiology of TD is yet to be definitively understood. The leading hypothesis is that TD is the result of chronic dopamine receptor blockage. In particular, this includes the dopamine receptors D2 and D3 by DRBAs. This hypothesis helps explain one of the other leading theories of TD. The theory says that TD is the result of long-term exposure to neuroleptics, D2 receptors upregulation and receptors becoming over sensitive at postsynaptic neuronal dopamine sites. This theory fails to explain why TD can be life-long in individuals that stop taking DRBAs as the idea would be that dopamine receptor super sensitivity would lessen as the receptors down regulate (Waln & Jankovic, 2013).

Another hypothesis of TD that has been supported in animal studies involving primates and rodents speculates that damaged or dysfunctional striatal y-aminobutyric acid (GABA) neurons can result in GABAergic low function and degeneration of the striatal fast-spiking interneurons that control the balance of indirect and direct basal ganglia pathways. This theory

named the “maladaptive synaptic plasticity” hypothesis believes that both D2 increased sensitivity and degeneration of neurons due to increased oxidative stress leads to negative effects on synaptic plasticity of glutaminergic synapses at the striatum. These changes create an imbalance of both direct and indirect basal ganglia pathways leading to abnormal messaging to the sensorimotor cortex. This abnormal information could result in improperly coded motor programming and abnormal movements (Waln & Jankovic, 2013).

The “neurodegenerative hypothesis” is a theory that helps explain the chronicity of TD in some individuals. This theory suggests that neuroleptic medications can increase free radical formation through increased lipid peroxidation. This can lead to damaged neurons and degeneration of various neurotransmitter systems. Chronic neuroleptic use is associated with an increase in free radical production and an impaired antioxidant system. Changes in some enzymes such as manganese superoxide dismutase and the superoxide dismutase gene are also related to TD (Waln & Jankovic, 2013).

At an individual level genetic susceptibility may help explain why some people taking neuroleptics develop TD while the majority do not. Many gene candidates are proposed to have an effect on a person’s predisposition for developing TD. Dopamine, serotonin, manganese superoxide dismutase, Catechol-O-methyltranferase COMT and others are theorized to possibly increase the risk of TD (Waln & Jankovic, 2013).

Epidemiology of TD

Reporting on TD in patients goes back as far as the 1950s, very soon after the first antipsychotic medications were being used in psychiatry practice. Although met with skepticism during the first few years of studying medications and patient behavior, several patient experiences worldwide have confirmed the relationship between antipsychotic drugs (APD) and

TD. Initial study results showed a risk of developing TD of 32% for patients taking APDs for 5 years, at 15 years there was a 57% risk of developing TD and after 25 years 68% risk of developing TD (D'Abreu, Akbar & Friedman, 2018). Later study results varied greatly with some studies showing far less incidences of TD with the SGAs while other studies showed no significant differences between FGAs and SGAs incidence of TD. A recent meta-analysis (D'Abreu, Akbar & Friedman, 2018) of over 40 studies between 2000 and 2015 that compared TD incidence between FGAs and SGAs showed a mean prevalence of 25.3% for all participant treatment groups. Population prevalence varied greatly from 8% in some populations to 75% in others. Population variations included: APD class, length of treatment with APD's, duration of illness, geographical region and baseline parkinsonism.

One cross-sectional study by D'Abreu, Akbar & Friedman (2018) of patients taking APD's found the TD prevalence to be about 33% of the 180 patients studied. This study also identified the most common causing antipsychotic medication. Perphanazine was the highest at 34.4% of a prevalence risk of developing TD, fluphenazine 16.6%, thioridazine 15.6%, chlorpromazine 11.1%, trifluperazine 8.3%, fluphenazine 6.7% (oral form), thiothixene 5.3% and haloperidol at 5.0% (D'Abreu, Akbar & Friedman, 2018).

Risk Factors

Several risk factors have been identified that can increase the chances of developing TD. The risk factors that increase the risk of TD include the total dose of the antidopaminergic agent/s over a lifetime, especially high doses of FGAs, adjunctive treatment with lithium, having a history of extrapyramidal symptoms (EPS), tobacco use, alcohol use, psychostimulant use, and history of central nervous system (CNS) damage (Szafranski, 2014). Additional risk factors

found in a study by Cornet et al. (2017) include being female, old age, being African or African American.

Other Causative Agents of TD

It has been well established in several studies (Cornett et al., 2017) that there is a cause and effect relationship between both FGAs/SGAs and TD. Several other classes of medications have been found to either cause TD or make it worse. Antiemetics will often potentiate the risk of a client developing TD due to dopamine antagonism. Metoclopramide has a strong association with developing TD. Anticholinergics such as procyclidine which is used for chronic obstructive pulmonary disease (COPD), bladder control and to treat EPS and Parkinson disease symptoms has been shown to increase TD. Other classes of medications that have shown an increased risk for developing TD include antidepressants (AD), anticonvulsants, antihistamines, decongestants, antimalarials, anxiolytics, biogenic amines, mood stabilizers and stimulants (Cornett et al., 2017).

Assessments for TD

Two commonly used assessments for TD include the AIMS and the Dyskinesia Identification System: Condensed User Scale (DISCUS). It is recommended that clinicians prescribing known TD causing medications to perform an assessment for TD at initiation of the medication and at least annually thereafter. Six-month assessments are recommended in the elderly population. The AIMS was created in the 1970's for the purpose of monitoring the development of TD. This assessment can be performed by any trained health care professional. The assessment takes about 10 minutes and measures 12 different items that are rated 0 (none) to 4 (severe). The results are generally not communicated to the client and a score of 2 or higher indicates TD. If the diagnosis of TD is suspected based on the AIMS score interventions include

assessing whether the client needs to be on the causing agent, dose reduction and a trial of clozapine as an alternative treatment. Clozapine use has shown little to no risk of developing TD and clients trialed or switched to this medication have experienced improvements in their TD (National Institute of Mental Health, n.d.). Another assessment tool is the DISCUS which is done at baseline, annually or every six months and monthly for 3 months following causative agent discontinuation. Criteria for use include cumulative three-month exposure to an APD and a score of 5 or above indicates TD (University of South Florida, n.d.). The DISCUS is a a more in-depth assessment, although the AIMS is more commonly used in clinical practice. Table 1 is the form used to perform an AIMS assessment. (see Appendix for the form used to perform an AIMS assessment)

Treatments for TD

According to an article by Citrome (2018), a five-step management strategy that can be used in the assessment and treatment of TD. Step 1 is recognition. Providers that prescribe APDs should recognize the high possibility of the development TD in clients. Although this risk can be mitigated with the use of SGAs there is still a prevalence rate of developing TD at around 20%. With the increasing use of APDs for other mental illnesses such as augmentation for major depressive disorder (MDD), the risk of developing TD is on the rise. Step 2 is effective assessment. Trained observation is required to assess for the symptoms of TD. Using a standardized rating scale such as the AIMS is useful for tracking risk of a client developing TD over time. Step 3 is harm reduction by decreasing the risk of TD. The ideal intervention would be to prevent TD, but this is not possible for all patients in all situations. With providers working in psychiatry being experts in the risk factors related to psychotropic medications, higher

causative agents and finding alternative treatments to DRBAs can help reduce the risk of clients developing TD. Step 4 is the intervention phase. When TD has been recognized in a client, steps are taken to address the TD. Recognized options for addressing TD include stopping/reducing the DRBA, switching from an FGA to an SGA and discontinuing any anticholinergic types of medications. Step 5 relates to following up with current symptoms and treatment plan effectiveness. The AIMS assessment is a useful tool for assessing progression of TD symptoms and should be done at treatment initiation and recommended intervals. AIMS assessment by itself is not enough to assess the effect of TD on a client. Further assessment questioning regarding impairments in functioning in various life areas should also be pursued during regular assessment intervals (Citrome, 2018).

Other testing that can be done to rule out other causes for involuntary movements include laboratory studies such as serum ceruloplasmin and the copper transporter gene of Wilson's disease. Imaging studies can also be helpful as they are typically normal in a client with TD. Imaging studies can assist in the differential diagnosis related to involuntary movements such as Huntington disease (Khouzam, 2015).

Additional treatment options for TD that have been and are being used off label include clonazepam, for which some benefit has been shown in TD (Citrome, 2018). The side effects and abuse potential must be weighed when considering prescribing benzodiazepines. Gingko biloba is thought to help due to its antioxidant properties. Anticholinergics have been used to treat EPS but really show no benefit in the treatment of TD. Anticholinergics have been shown in some cases to aggravate symptoms of TD. There is minimal evidence for the use of botulinum toxin intramuscular (IM) injections in the treatment of TD. Tetrabenazine was commonly used to treat TD due to its effectiveness in the treatment of Huntington's chorea. Data concluded that

Tetrabenazine is lacking in effectiveness for treatment of TD. There is also a significant side effect profile of this medication making it a poor choice for the treatment of TD. Other medications that have been used off label but lack any evidence for effectiveness in the treatment of TD include levetiracetam, propranolol and zolpidem.

New treatments "approved" for TD.

As of 2017 the FDA has approved two new medications for the treatment of TD in adults. The first was Ingrezza (valbenazine), a vesicular monoamine transporter 2 (VMAT2) inhibitor. The action of this medication allows less new and recycled dopamine to be transported into vesicles in the presynaptic neuron, thus less dopamine is available to be transported into the synapse during neurotransmission. This reduction in dopamine in the synapse is thought to help with the upregulation and over sensitization of postsynaptic dopamine receptors. The mechanism of action and effectiveness is proof that the theory behind the pathophysiology of TD involves chronic dopamine receptor blockage leading to upregulation and supersensitivity (Uhlyar & Rey, 2018). As of the publication of this article by Uhlyar & Rey (2018) the efficacy and safety of valbenazine had been studied in two randomized, double-blind, placebo-controlled trials, Kinect 2 and 3. Both trials used AIMS scores to rate the status of TD in the participants. Valbenazine differed from previous VMAT2 inhibitors by being effective without a significant side effect profile. In the Kinect 2 study at 6 weeks the reduction in AIMS scores for the experimental group was 3.6 while the control group was 1.1. The Kinect 3 trial at 6 weeks showed a mean reduction in AIMS scores of 3.2 vs. the placebo group.

Adverse effects based on combined data from both treatment groups showed the highest being somnolence and anticholinergic effects. Dosing recommendations for valbenazine is an oral dose of 40 mg daily for 1 week, then 80 mg daily. QT prolongation was identified as an

adverse effect with the use of valbenazine. A pre-treatment ECG is warranted prior to use with clients. No studies have been done in pediatric or geriatric populations and the FDA has not approved its use in these populations. Clients with hepatic/renal failure should continue to receive the 40 mg daily. There is little data in in study to support valbenazine's use in pregnancy and female clients should be cautioned about the risks. Animal studies showed negative effects at birth and the metabolite of valbenazine was found in the milk of rodents. Valbenazine does have drug-drug interactions that warrant consideration such as monoamine oxidase inhibitors (MAOI), CYP3A4 inhibitors, CYP2D6 inhibitors, CYP3A4 inducers along with digoxin (Uhlyar & Rey, 2018). The price for valbenazine is high and there is no generic medication at this point. The manufacturer does provider a patient assistance program to help mitigate the cost for clients that can't afford the medication.

The second medication to be approved for the treatment of TD in adults is Austedo (deutetrabenazine). Deutetrabenazine is another VMAT2 inhibitor. It was also studied in two trials, the ARM-TD and AIM-TD. Deutetrabenazine was initially approved for the treatment of Huntington's chorea and later had its approval expanded by the FDA for TD in adults. Results were significant in both the treatment groups vs. placebo and like valbenazine, deutetrabenazine had a preferable side effect profile to previous VMAT2 treatments. Dosing for deutetrabenazine is 12 mg daily in divided doses and can be increased by 6mg daily to a max dose of 48 mg daily. Deutetrabenazine must be taken whole with food. There are drug-drug interactions with MAOI's, reserpine and tetrabenazine, and caution should be taken in patients taking strong CYP2D6 inhibitors. QT prolongation is a concern and an ECG should be considered prior to use along with caution for patients taking other medications known to cause QT prolongation. No medication changes are needed in patients with renal problems, and the medication is

contraindicated in hepatic impairment. Data in studies related to use in pregnant/breastfeeding women is lacking. Deutetrabenazine does have a black box waring for suicide and depression risk in Huntington disease patients along with several other warnings of side effects for this population (Touma & Scarff, 2018).

Comparing the two, seeing that both show similar efficacy in the treatment of TD in adults vs. placebo, valbenazine can be dosed once daily and does not require food, while deutatrabenazine is safer in patients with renal impairment. The black box warnings associated with deutetrabenazine are due to its approval for Huntington's chorea patients. In the severe and persistently mentally ill population simplifying medication regimens is beneficial and once daily dosing would be a benefit for compliance.

Case Study

In a case published by Kim, MacMaster & Schwartz (2014) a 67-year-old male client diagnosed with persistent depressive disorder was assessed to be lip wetting for about 1 year. His treatment for the previous 7 years included aripiprazole 10 mg daily and tiagabine at different doses between 4-24 mg daily. Anxiety was not fully controlled and buspirone 15 mg daily was prescribed. The client was maintained on this regimen for the next 4 years with good response. At his initial assessment in the new setting his lip wetting was thought to be due to chronic chapped lips and were controlled with over the counter (OTC) remedies. A different provider suspected TD as the cause for the behavior and tapered the client off the aripiprazole while leaving the other medications unchanged. The client's mood remained stable for three months, but the lip wetting/smacking behavior continued. Tongue protrusions began to develop. The client's TD symptoms became worse after discontinuation of the aripiprazole. Withdrawal TD was suspected, and several supplements were tried to relieve the symptoms pf TD. Supplements

including Vitamin E, Gingko biloba and branch chain amino acids were started without success and were stopped after shown to be ineffective in relieving TD symptoms. TD symptoms did improve over the next year but never completely resolved with discontinuation of aripiprazole.

This case study is a good example that SGAs can cause TD and discontinuation of the causing agent did help reduce the symptoms although not completely resolving them. At the time of this article the new VMAT2 medications were not available.

Implications

Prior to the availability of the two new medications for treatment of TD, back in 2013 the American Academy of Neurology (AAN) (2013) released practice recommendations for the treatment of TD that a psychiatric nurse practitioner could utilize for managing care. Many medication agents were reviewed in the practice guideline that spanned several different classes of medications. The majority of medications reviewed for the treatment of TD were lacking in evidence for a therapeutic use in the treatment of TD (Peckham & Nicewonder, 2018). There will need to be more research to support the medications within the guidelines for the treatment of TD.

In the success of the case study client sample, a combination of both discontinuing the antipsychotic/s and anticholinergic medications, and the addition of valbenazine resolved the hyperkinetic movements of the client. Long term studies and practice-based data still needs to be gathered for both valbenazine and deutetrabenazine to determine side effects and long-term effects. Both medications are still undergoing post market investigation (Peckham & Nicewonder, 2018). Psychiatric nurse practitioners are in a unique role where education can be provided on the pros, cons, and risks of treatment. Participating in publishing case study

examples of treatment outcomes can assist with developing the evidence that is needed for long-term studies of the side effects and benefits to clients.

Psychiatric nurse practitioners that prescribe medications that have the potential to cause TD need to first be aware that the medications they prescribe carry this adverse risk. Psychiatric nurse practitioners have a responsibility to stay current on the literature regarding the assessment for TD, causes of TD, and interventions and medications to treat TD.

Conclusion

Although theories exist, the exact cause of TD is still a mystery. The connection between medication classes and TD has been established which gives psychiatric nurse practitioners best practice recommendations to follow when treating a psychotic disorder or augmenting with FGAs/SGAs for other mental illnesses. With the addition of new treatments for TD providers and clients may finally have an effective intervention for this disorder.

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Appendix

Abnormal Involuntary Movement Scale (AIMS)

Public Health Service
Alcohol, Drug Abuse, and Mental Health Administration
National Institute of Mental Health

NAME: _____
DATE: _____
Prescribing Practitioner: _____

CODE 0=None
1=Minimal, may be extreme normal
2=Mild
3=Moderate
4-Severe

INSTRUCTIONS:
Complete Examination procedure (attachment d.)
Before making ratings

MOVEMENT RATINGS: Rate highest severity observed. Rate movements that occur upon activation one less than those observed spontaneously. Circle movement as well as code number that applies.		RATER Date	RATER Date	RATER Date	RATER Date
Facial and Oral Movements	**1. Muscles of Facial Expression** e.g. movements of forehead, eyebrows, periorbital area, cheeks, including frowning, blinking, smiling, grimacing	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
	2. Lips and Perioral Area e.g., puckering, pouting, smacking	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
	3. Jaw e.g. biting, clenching, chewing, mouth opening, lateral movement	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
	4. Tongue Rate only increases in movement both in and out of mouth. NOT inability to sustain movement. Darting in and out of mouth.	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4	O 1 2 3 4
Extremity Movements	**5. Upper (arms, wrists,, hands, fingers)** Include choreic movements (i.e., rapid, objectively purposeless, irregular, spontaneous) athetoid movements (i.e., slow, irregular, complex, serpentine). DO NOT INCLUDE TREMOR (i.e., repetitive, regular, rhythmic)	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
	6. Lower (legs, knees, ankles, toes) e.g., lateral knee movement, foot tapping, heel dropping, foot squirming, inversion and eversion of foot.	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
Trunk Movements	**7. Neck, shoulders, hips** e.g., rocking, twisting, squirming, pelvic gyrations	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
Global Judgments	**8. Severity of abnormal movements overall**	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
	9. Incapacitation due to abnormal movements	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
	10. Patient's awareness of abnormal movements Rate only patient's report No awareness 0 Aware, no distress 1 Aware, mild distress 2 Aware, moderate distress 3 Aware, severe distress 4	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4	0 1 2 3 4
Dental Status	**11. Current problems with teeth and/or dentures?**	No Yes	No Yes	No Yes	No Yes
	12. Are dentures usually worn?	No Yes	No Yes	No Yes	No Yes
	13. Edentia?	No Yes	No Yes	No Yes	No Yes

	14. Do movements disappear in sleep?	No	Yes	No	Yes	No	Yes	No	Yes

National Institute of Health (n.d.)