# Internal Memorandum

To: Martha Steele, Meg Blanchet
From: Jonathan L. Burstein, MD
CC: Danvers Vocal Tics Project File
Date: November 26, 2013
Re: Medical Record Review, Tic Disorder, Essex County

**Background and Purpose of Medical Records Review:**

A review of medical records was conducted as part of the MDPH/BEH efforts to investigate reports of acquired vocal disorders such as neurological vocal tics and repetitive hiccups among some students at either Essex Agricultural and Technical High School or North Shore Technical High School, located in Danvers and Middleton, respectively. The purpose of the medical records review was to 1) determine whether the symptoms/diagnoses could possibly be related, and 2) identify any potential common factors (environmental or non-environmental) that may have contributed to the development of vocal tics or vocal disorders among these children.

Information provided by families of the students at the outset of the MDPH investigation indicated that the majority of students experiencing vocal tic or chronic hiccup symptoms were connected by sports team membership. It was also reported that most started experiencing vocal tic or chronic hiccup symptoms within the previous year.

An authorization for disclosure of Medical Records consent form was distributed to over 2600 area physicians in March and again May 2013 to request their assistance in identifying patients they have treated with an acquired vocal disorder who attend one of these two schools. In addition, MDPH staff provided medical records consent forms directly to school parents in response to individual requests. Based on these efforts,

MDPH received signed consent to request and review medical records for nine individuals.

**Review of Medical Records:**

A total of nine sets of medical records were reviewed; records from multiple providers were available for most of the nine cases. A summary of the case review series is provided below:

- All patients had tics noted in their medical record sometime during 2012, except [redacted] who had experienced tics for approximately 4 years.
- The 9 cases were all [redacted] ging in age from [redacted] f age.
- 8 cases were documented as being associated with the school sports teams; for 1 case, such information was not found in the record.
- All 9 cases were noted to have vocal (simple phonic) tics, most typically described as hiccups, yelps, or grunts. In 2 cases, the tics ceased at night, and in one other case they ceased during school vacation. No motor tics were described.
- No cases had documented hepatic or renal damage; 7 cases had such screening documented.
- 1 case has carried the pre-existing diagnosis o [redacted] with vocal tics for approximately the last 4 years, long before the onset of vocal tic symptoms reported in the other students.
- 1 case has a personal history of seizure disorder. 1 further case has a family history of seizure disorders. In neither case were the seizures as described associated with isolated vocal tics.
- Of the 9 cases, 6 had specific lab results that ruled out recent strep infection. 2 had no testing noted; 1 case was treated for strep pharyngitis after the onset of tics without documented change in tic symptoms. No cases had carditis or rheumatic fever.

- Of the 9 cases, 3 had lab results that excluded Lyme disease. No cases had active Lyme disease documented.
- 4 cases had documented orthopedic injuries but none had head injuries noted.
- No new medications were added to the cases' regimens prior to tic onset.
- While several cases' medical records mentioned possible environmental exposure, no records documented known exposure or putative agent. The mentions were all in the context of discussing MDPH's pending investigation.

The differential diagnosis of vocal tics is broad, and includes such etiologies as inborn errors of metabolism (e.g. Lesch-Nyhan syndrome), chronic neurologic disorders such as temporal lobe epilepsy and Tourette's syndrome, toxicity causing neurologic injury such as carbon monoxide poisoning, Sydenham's chorea and possibly PANDAS (pediatric autoimmune neuropsychiatric disorder associated with streptococcal infections) due to the autoimmune aftereffects of streptococcal infection, head trauma, encephalitis, meningitis, and conversion or mass psychogenic causes.

The etiologies fall into four broad groups: long-term neurologic disease, toxic or mechanical neurologic injury, infectious injury or exposure, and sociogenic/somatoform disorders. The case review series, while small, is helpful in somewhat narrowing the differential diagnosis.

Few of the cases reviewed, and few people in a general population, would have long-term neurologic illness as the cause of tics. While one case has a preexisting medical condition that could result in vocal or motor tic symptoms, the diagnosis was long before the onset of symptoms in the other individual cases and based on information provided in the medical records, none of the other eight cases share this condition. Further, the event pattern here is relatively acute (i.e. except for the case with [redacted] all other tic symptoms were reported in the medical records during 2012), and affects late-teenage persons, which makes such illness even less likely as a cause.

Toxic or mechanical injury can cause tics, but toxic injury would also cause other unmistakable signs such as altered level of consciousness, delirium, renal or hepatic injury, or motor tics. It is important to note that isolated vocal tics as a result of a toxic exposure have not been described based on review of the literature. No evidence of such exposures can be found in this case review, and the gender pattern ([redacted] does not support a toxic exposure, as human physiology is rarely so dimorphic in toxin response. Mechanical injury to the central nervous system was not found in this series.

Infectious etiologies such as meningitis or encephalitis were not found in the cases reviewed. Post-streptococcal disorders might potentially be associated with tics, but a large proportion of the cases reviewed had recent and current strep infection ruled out, making it an extremely unlikely etiology. Lyme disease is not known to cause isolated vocal tics, and in any case active Lyme disease was not seen in this group of patients.

Somatoform or sociogenic causes cannot be ruled in or out based on the information available in the medical records for this small and nonrandom sample.

**Summary and Recommendations:**

Although the medical records confirm that at least eight of the nine cases share participation in school sport team activities, no common medical factors were identified among the group of cases that would suggest a common neurological, mechanical, infectious or toxic etiology based on the information contained in the medical records reviewed. Three of the nine cases did have at least one possible predisposition for vocal tics ([redacted] or personal/family history of seizures), but none of the other six individuals had potential predispositions for vocal tics reported in their medical history.

Although six of the nine cases had lab tests that ruled out recent strep infection, it seems prudent to recommend that any patients with tics who have not already been tested for

recent strep infection be tested. The usual test for this would be measurement of the "anti-streptolysin O titer".

Based on the information contained in the medical records reviewed, it is not possible to rule in or rule out the possibility of any conversion or mass psychogenic factors. No specific treatments for these tics suggest themselves, but literature-based prognostic outlook would suggest that the tics will slowly decline and cease in the affected cases over the next year.

**List of References:**


Transient Vocal Tic Disorder.
http://www.nlm.nih.gov/medlineplus/ency/article/000747.htmAccessed Nov. 12, 2013.

Diagnosing Tic Disorders.
http://www.cdc.gov/ncbddd/tourette/diagnosis.html.
Accessed Nov. 12, 2013.

PANDAS.
http://www.nimh.nih.gov/health/publications/pandas/index.shtml
Accessed Nov. 12, 2013.

Singer HS (2011). "Tourette syndrome and other tic disorders". Handbook of Clinical Neurology **100**: 641–57.

de Oliveira SK, Pelajo CF (March 2010). "Pediatric Autoimmune Neuropsychiatric Disorders Associated with Streptococcal Infection (PANDAS): a Controversial Diagnosis". *Curr Infect Dis Rep* **12** (2): 103–9.

Gadow KD, Nolan EE, Sprafkin J, and Schwartz J. 2002. Tics and psychiatric comorbidity in children and adolescents. Dev Med Child Neurol. 44(5):330-338.

Pichichero ME (2009). "The PANDAS syndrome". *Adv Exp Med Biol*. Advances in Experimental Medicine and Biology (Springer) **634**: 205–16.

Robertson MM. 2000. Tourette syndrome, associated conditions asnd the complexities of treatment. Brain 123:425-462.

Shulman ST (February 2009). "Pediatric autoimmune neuropsychiatric disorders associated with streptococci (PANDAS): update". *Curr. Opin. Pediatr.* **21** (1): 127–30