Protect Your Neuromusculoskeletal and Vocal Health Every Day

Information and Recommendations for Student Musicians

Student Guide

National **A**ssociation of **S**chools of **M**usic
Performing **A**rts **M**edicine **A**ssociation

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Protect Your Neuromusculoskeletal and Vocal Health Every Day

Introduction

In working toward a degree in music, you are joining a profession with a long and honored history. Part of the role of any professional is to remain in the best condition to practice the profession.

For all of you, as aspiring musicians, this involves safeguarding your neuromusculoskeletal and vocal health. Whatever your plans after graduation – whether they involve playing, teaching, producing, or simply enjoying music – you owe it to yourself and your fellow musicians to do all you can to protect yourself.

The neuromusculoskeletal system refers to the complex system of muscles, bones, tendons, ligaments, and associated nerves and tissues that support our body's physical structure and enable movement.

In this resource document, the term "neuromusculoskeletal" is used to encompass not only overt physical movements (the pressing of a key, the strumming of a string) and overall body alignment, but also the small internal movements our bodies make, for example to produce breath and modify vocal sounds.

Therefore, vocal health is referred to as a component of neuromusculoskeletal health. When the term "neuromusculoskeletal" is used, vocal health is included. A number of direct references to vocal health are interspersed throughout this guide. Special attention is devoted to issues of vocal health in the sections neuromusculoskeletal issues affecting the voice and vocal protection.

Good health and healthy behaviors are important to all musicians, regardless of instrument or area of specialization.

Vocal health is important, too. As current music students and future music professionals, you not only use your voice to speak, but now or sometime down the road, you may find yourself engaged with the singing voice in your role as a conductor, coach, teacher, recording engineer, researcher, therapist, or other music professional.

Of course, there are certain behaviors, especially those involving excessive physical and vocal stress and strain, which can endanger your neuromusculoskeletal and/or vocal health.

Sometimes our bodies and voices recover from strenuous behaviors rather quickly, but other times the effects linger. Our recovery time is often tied to our level of fitness and ability.

Many of you may be picturing a novice athlete who doesn't warm up properly, who plays too hard during a game or match, and who then ends up with an injury – maybe a sprained ankle or a pulled muscle.

But, as you know, athletes aren't the only ones who train and practice in order to reach the pinnacle of performance. Musicians do that, too.

The work of musicians, like that of athletes, is physically demanding. And musicians, just like athletes, need to warm up. They need to utilize proper form. They need to take breaks. They need to avoid "overdoing it." And they need to take the proper precautions to safeguard their neuromusculoskeletal and vocal health, so that they can continue to play and sing the music they love for years to come.

Some of you may have already been diagnosed with some sort of neuromusculoskeletal or vocal condition or disorder. It may be tied to your genetic makeup. It may be linked to a past injury or infection. Or it may be linked to a particular repeated behavior, your posture, or something else.

The purpose of this resource document is two-fold. First, it's intended to inform you about some of the most common neuromusculoskeletal and vocal conditions and disorders that affect musicians. And second, its contents can help to empower you to take control of your own neuromusculoskeletal and vocal health. The majority of these conditions are preventable. But you've got to be proactive and protective of your health. Avoid putting yourself at risk.

The bottom line is this: If you're serious about pursuing a career in music, you need to treat your body with respect. You need to demonstrate proper form and technique when playing and singing. And you need to recognize your physical limitations. Sometimes, the most important thing you can do is take a deep breath and take a break.

Disclaimer

The information in this presentation is generic and advisory in nature. It is not a substitute for professional, medical judgments or advice. It should not be used as a basis for medical treatment. If you are concerned about your physical dexterity or your voice, or think you may be experiencing the symptoms of a particular neural, musculoskeletal, or voice disorder, consult a certified or licensed medical or healthcare professional.

Purpose of this Resource Document

The purpose of our presentation is to share with you some information on neuromusculoskeletal and vocal health, conditions, and disorders and to let you know about the precautionary measures that all of us should practice daily.

Music, the Musician, and Neuromusculoskeletal and Vocal Health

So, for most of you, practice is paramount to your success as a musician. It's likely that the days when you *don't* practice are few and far between. It takes a lot of time, dedication, and skill to be a successful musician. The act of practicing our music gradually takes a toll on us, especially when practice involves long hours and infrequent breaks.

We practice alone, we practice with others, we practice for concerts, we practice for juries, and we practice for competitions. In other words, we practice a lot. We practice to be the best we can be. And from time to time, we experience aches and pains.

All of us know that the life of a musician is busy and strenuous.

Decisions about when and how we practice – and for how long – have an effect on our neuromusculoskeletal and vocal health. So, too, does our behavior outside of music classrooms, rehearsal halls, and concert venues.

As musicians, are responsible for our art. We need to cultivate a positive relationship between music and our neuromusculoskeletal and vocal health. Balance, as in so many things, is an important part of this relationship.

The Neuromusculoskeletal System

The neuromusculoskeletal system refers to the complex system of muscles, bones, tendons, ligaments, and associated nerves and tissues that allow us to move and to speak and sing. Also, this system supports our body's physical structure.

The "neuro" part of the term "neuromusculoskeletal" refers to our nervous system, which coordinates the ways in which our bodies move and operate. The nervous system consists of the brain, the spinal cord, and the hundreds of billions of nerves responsible for transmitting information from the brain to the rest of the body and back to again, in an endless cycle.

Our nervous systems allow us to move, to sense, and to act in both conscious and unconscious ways. We could not listen to, enjoy, sing, or play music without these structures.

Vocal Anatomy

Our vocal system is a part of our larger neuromusculoskeletal system. Our voice is produced by four component systems. These are often referred to as the "generator," the "vibrator," the "resonator," and the "articulator."

The "generator" is our breath that is provided to us by our lungs. The diaphragm, along with numerous other muscles within our abdomen, ribs, chest, and back, help us to move breath throughout our respiratory system.

The "vibrator" is the larynx, commonly referred to as the "voice box." Horizontally stretched across the larynx are two folds of mucous membrane. These are called the "vocal folds," or "vocal cords." And so, when breath from our lungs passes along our vocal folds, vibrations occur.

The "resonator" is the resonating cavity above the larynx that gives the voice its particular tonal quality. The resonator includes the vocal tract, much of the pharynx, or throat, the oral cavity, and the nasal passages.

The "articulator" includes our tongue, lips, cheeks, teeth, and palate. Together, these parts help us to shape our sounds into recognizable words and vocalizations; they help us to articulate.

These four component parts – the "generator," the "vibrator," the "resonator," and the "articulator" – work together to produce speech, song, and all order of vocalizations.

Disorders of the Neuromusculoskeletal System

Sometimes, within our complex physical bodies, something goes wrong, and we find ourselves victim to a neuromusculoskeletal disorder. The causes and contributing factors vary, but such disorders generally fall into one of the following three categories: 1) disorders with a genetic link; 2) disorders resulting from trauma or injury; and 3) disorders that are related to our behavior.

Some common symptoms of all neuromusculoskeletal disorders include pain, stiffness, aching, throbbing, cramping, and muscular weakness.

Some disorders may be permanent, while others may be temporary.

In some cases, a simple change in behavior or some rest and relaxation can help to eliminate or reduce certain symptoms.

Other times, it's not so simple, and medical professionals may need to prescribe certain treatments, such as surgery, therapy, or medication.

Contributing Factors

The exact causes of behavior-related neuromusculoskeletal disorders are manifold. However, these causes generally fit into one of two basic categories or factors. They are: 1) musculoskeletal overuse and/or misuse and 2) genetic factors.

1. Overuse/Misuse (and Abuse)

Overuse

The human body, as we all know, has certain physical limits. In arts medicine terminology, "overuse" is defined as a practice or activity in which anatomically normal structures have been used in a so-called "normal" manner, but to a degree that has exceeded their biological limits. Overuse produces physical changes in our muscles, tendons, ligaments, etc., and that's when we experience symptoms, such as pain and discomfort.

So, how much activity is too much? What exactly constitutes overuse? Well, there's no simple answer to either of these questions. The amount of excessive activity needed to produce these results varies from person to person. Often, it's tied to a person's individual anatomy and physiology.

Musicians who are dealing with changes to their musical routine may find themselves "overdoing it." In the face of high self-expectations, musicians who are beginning at a new school or who are starting lessons with a new instructor may be more apt to overdo it, to push themselves too hard.

Similarly, musicians who are taking up a new instrument may overdo it, as they work to quickly advance their skills.

Really, any musician who rapidly increases his or her practice time or intensity is likely to overdo it and increase his or her level of risk.

When it comes to overuse, what we need to ask ourselves the following questions: "Is my body well conditioned enough to handle this kind and amount of physical activity? Am I changing my musical routine too drastically or too quickly? Why am I making this change?" These are questions that require honest and individualized answers.

Misuse

"Misuse" is when we use our bodies to perform physical tasks in abnormal ways – and sometimes to excessive degrees. When we misuse certain bodily structures, we put them under stress. This can lead us to experience symptoms such as pain and discomfort.

In music, an example of physical misuse is improper technique. Improper technique can involve poor or "lazy" posture. For instrumentalists, it can involve playing with excessive pressure or

force. It can also involve a physical mismatch between player and instrument. For singers, it can involve singing too loudly or singing out of range.

Remember, good posture and technique are important. They'll make playing and singing easier, and you'll be less likely to hurt yourself.

Abuse

Abuse is related to both overuse and misuse. We abuse our own bodies when we perform an activity not only excessively or improperly, but also in a conscious, willful manner, over a sustained period of time. A common example is "playing through the pain." Football players can be frequent perpetrators, but so are some musicians. In their quest to be the best, they let their own physical well-being take a back seat, and end up hurting themselves.

Playing or singing through the pain is not an acceptable option. If you're hurting, stop. Tell your instructor that you're not okay. Your instructor will likely have a protocol in place. This may include asking you to sit on the sidelines and make notes in your music, or you may be excused from class to seek treatment. Ultimately, if you are experiencing chronic pain, consult with a medical professional, and follow the treatment plan they provide. Your health is too important to be playing through the pain.

Abuse can also involve the use of alcohol or other dangerous substances. Don't smoke or use any drug not prescribed by a medical professional licensed to do so.

2. Genetic Factors

There are also some genetic predispositions that can increase a person's risk of developing one or more behavior-related disorders.

One of the most common genetic factors in this category is double-jointedness. Medically known as "hypermobility," people with this condition have joints, ligaments, and tendons with an extended range of motion. Such joint instability can increase a person's risk of developing various muscle pain syndromes. It can also lead to tendinitis, an inflammation of the tendon. (Tendons, as you may know, are the tough bands of fibrous tissue that connect muscle to bone.)

Individuals with hypermobile joints tend to compensate for this instability by over-tensing their muscles. While this extra muscle tension can help them to better control their movements, it can also increase their risk of damaging or straining a muscle.

People with hypermobility are generally encouraged to monitor and actively reduce the amount of tension that they carry in their muscles in order to reduce the risk of future pain and discomfort.

Specific strengthening exercises may be recommended, or they may employ external methods of joint support, such as small ring splints or tape.

Neuromusculoskeletal Issues Affecting the Body

Below are a number of neuromusculoskeletal complications and disorders that are likely to affect the musician's body.

1. Muscle Pain

For musicians, muscle pain can be the result of overuse, misuse, poor posture, tension, technical problems, or poor conditioning.

Muscles that are fatigued are less able to contract as strongly and frequently as "normal" muscles. With continued use, fatigued muscles are placed under greater stress, and this can lead to microscopic damage and disruption of the muscle fibers, a condition known as muscle strain.

Muscle contraction is both a physical and a chemical process. When the necessary chemical compounds are in short supply, muscles can no longer operate at optimal efficiency. When muscles contract, they produce lactic acid. When lactic acid builds up in tissues, it minimizes the muscle's ability to continue efficient contractions.

Some kinds of muscle pain may subside once an activity is stopped, but others will linger.

In the case of muscle strains, the pain may dissipate, but a regimen of rest, ice, and/or anti-inflammatory medications may be necessary in order to reduce swelling and help facilitate a quicker recovery. As always, it's best to get your advice and treatment plan from a medical professional.

For musicians, muscle pain that stems from performing music is commonly felt in specific body locations. The neck and shoulders; the hands, wrists, and fingers; and the lower back are the most frequently affected areas. Some musicians are more susceptible to certain injuries than others. For example, clarinetists are at greater risk for right thumb pain. Double bass players are more likely to experience pain in the lower back.

So, just remember this, when it comes to muscle pain, give your body a break and rest your weary muscles for as long as it takes. Resuming activity prematurely often exacerbates the problem and leads to more trouble in the long run.

2. Neuropathies

"Neuropathy" is a general medical term that refers to diseases or malfunctions of the nerves. Neuropathies are classified by the types or locations of the nerves they affect.

Focal neuropathies are those focused on one nerve or group of nerves within a particular area of the body. Symptoms usually appear suddenly and can include pain; sensory disturbances, such as numbness, tingling, "pins of needles" sensations, burning, or even itching; and weakness. In the case of bodily extremities, the pain may occur at the site of a nerve compression or entrapment. Nerve compressions, or entrapments, occur when a nerve passes through a narrowed channel bounded by bone, fibrous bands, bulky muscles, or enlarged arteries on its way to or from its ultimate destination – either toward or away from the brain and spinal cord.

In other cases, the pain may be distributed anywhere along the course of the nerve. Individuals with this kind of nerve pain may later on find themselves experiencing muscle weakness and impaired dexterity.

Three of the most common entrapment neuropathies for musicians include: 1) carpal tunnel syndrome, 2) ulnar neuropathy, and 3) thoracic outlet syndrome.

Carpal Tunnel Syndrome

Often associated with people who type for a living, carpal tunnel syndrome occurs when the median nerve, which runs from the forearm into the palm of the hand, becomes pressed or squeezed at the wrist. The carpal tunnel – a narrow, rigid passageway of ligament and bones at the base of the hand – contains the median nerve and several tendons. When irritated or strained, these tendons may swell and narrow the tunnel, compressing the median nerve. The result can be pain, weakness, or numbness in the hand and wrist that radiates up the arm.

Although some experts tie carpal tunnel syndrome to repeated actions, especially those involving the hands and wrists, others cite a genetic predisposition. It is also associated with certain medical conditions, including diabetes, arthritis, and hypothyroidism. It is often very difficult to determine the precise cause of carpal tunnel syndrome.

Whatever the cause, it is a good idea to occasionally rest and to stretch the hands and wrists when performing repetitive tasks or musical exercises. For individuals diagnosed with carpal tunnel syndrome, a doctor may recommend the use of a wrist splint, especially at night.

Ulnar Neuropathy

Ulnar neuropathy is a condition in which the ulnar nerve, which runs from the neck along the inside edge of the arm into the hand, becomes inflamed due to compression of the nerve.

Symptoms include tingling, numbness, weakness, and pain, primarily along the elbow, the underside of the forearm, and along the wrist or edge of the hand on the little (pinky) finger side.

Compression of the ulnar nerve is often linked to repetitive wrist or elbow movements. Musicians of bowed instruments are at a heightened risk for developing this condition, because playing a bowed instrument involves sustained elbow flexion.

Treatment for ulnar neuropathy may involve pain medication, the use of splints to restrict motion, and various exercises.

Thoracic Outlet Syndrome

Thoracic outlet syndrome refers to a group of disorders that occur when the blood vessels or nerves in the thoracic outlet – the space between the collarbone and first rib – become compressed. It is most often the result of poor or strenuous posture, or of constant muscle tension in the neck and shoulder area. Symptoms include pain in the neck and shoulder areas and numbness in fingers.

Doctors may prescribe a variety of stretches and exercises in order to treat the symptoms of thoracic outlet syndrome.

Proper body alignment and sufficient muscle strength can both help to decrease the risk of thoracic outlet syndrome among musicians.

3. Dystonia

Dystonia involves sustained muscular contractions. These muscular contractions produce unwanted movements or abnormal postures in people. The exact cause of dystonia is unclear.

Like a focal neuropathy, focal dystonia is focused on a particular area of the body, and certain sets of muscles within that area of the body are involved.

Because men are more frequently affected than women, it is possible that genetic or hormonal factors are to blame.

Also, as is the case with carpal tunnel syndrome, repetitive movements, especially those that are painful, seem to be a trigger for dystonia.

In the instrumental musicians, these sustained muscle contractions frequently affect the upper arm. This is especially true for keyboard, string, percussion, and woodwind players. In brass and woodwind players, the embouchure may be affected.

Neuromusculoskeletal Issues Affecting the Voice

There are also a number of neuromusculoskeletal issues that can adversely affect the musician's voice.

Some common medical conditions affecting the voice are phonatory instability, vocal strain, and vocal fold motion abnormalities.

1. Phonatory Instability

Phonation, as you may know, is the process by which air pressure, generated by the lungs, is converted into audible vibrations. One method of phonation called "voicing" occurs when air from the lungs passes along the elastic vocal folds at the base of the larynx, causing them to vibrate.

Production of a tonal, pleasant voice with smooth changes in loudness and pitch depends upon the symmetrical shape and movement of the vocal folds.

Phonatory instability occurs when there is asymmetrical or irregular motion of the vocal folds that is superimposed on the vocal fold vibration.

Short-term causes of phonatory instability include fatigue, effects of medication, drug use, and anxiety. These problems tend to resolve rapidly if the cause is removed. Fatigue is another common cause of short-term phonatory instability.

Additionally, over-the-counter allergy medications, anti-depressants, and highly caffeinated drinks, which stimulate the nervous system, can often cause vocal tremors, a form of phonatory instability.

Drug use, alcohol use, and smoking all adversely affect our control of vocal folds and should be avoided.

2. Vocal Strain

Another issue for vocal musicians is vocal strain. Overuse of the voice in any capacity – singing or speaking – can produce vocal strain.

Singers must be aware of problems associated with singing at the extremes of vocal range, especially the upper end.

Both duration and intensity of singing are as important as they are for instrumentalists. In other words, avoid overdoing it.

Singers should also avoid attempting repertoire that is beyond their individual stage of vocal maturity and development.

Improperly learning and practicing certain vocal styles is also dangerous.

3. Vocal Fold Abnormalities

Prolonged overuse can, in some cases, lead to the development of nodules on the vocal folds. The nodules appear initially as soft, swollen spots on the vocal folds, but overtime, they transform into callous-like growths. Nodules require specialized and prolonged treatment and rehabilitation and can be of grave consequence to singers.

Basic Protection for All Musicians

As musicians, it's vital that you protect your neuromusculoskeletal health whenever possible.

Here are some simple steps you can take:

1. When possible, avoid situations that put your neuromusculoskeletal health at risk.
2. Refrain from behaviors that could compromise your neuromusculoskeletal health and the health of others.
3. Warm up before you practice and perform.
4. Take regular breaks from practice and rehearsal. A good rule of thumb is a 5-minute rest every half hour.
5. Limit excessive practice time.
6. Avoid excessive repetition of difficult music, especially if progress is slow.
7. Insomuch as possible, avoid playing and/or singing music that is beyond your physical abilities or outside your natural range.
8. Refrain from sudden increases in practice and playing time.
9. Maintain good posture in life and when you practice and perform music. Be mindful of alignment, balance, and weight distribution.
10. Use external support mechanisms, such as shoulder rests, neck straps, and flute crutches, when necessary.
11. Maintain good "mental hygiene." Get adequate sleep, good nutrition, and regular exercise.
12. Refrain from recreational drug use, excessive alcohol use, and smoking.
13. Do your best to limit and control stressors. Plan ahead.
14. Give yourself time to relax.

Vocal Protection

Here's some extra advice for safeguarding your voice:

1. Drink plenty of water, at least 8 glasses a day.
2. Limit your consumption of caffeine and alcohol.

3. Don't smoke.
4. Be aware that some medications, such as allergy pills, may dry out your vocal tissues. Be aware of side effects and talk to your doctor if you have questions.
5. Avoid dry air environments. Consider using a humidifier.
6. Avoid yelling or raising your voice unnecessarily.
7. Avoid throat clearing and loud coughing.
8. Opt to use vocal amplification systems when appropriate.
9. Rest your voice, especially if you are sick. Your voice and your body need time to recover.

Marching Musicians

Musicians in marching bands and drum corps need to maintain a high level of physical conditioning, strength, and endurance. Their rehearsals and performances are very physical and require very precise movements, all while carrying an instrument.

Marching musicians are at an increased risk for sprained ankles, toe contusions, and knee strains, and the heavy instruments that you carry place great amount of physical stress on the neck, torso, lower back, and legs.

In some climates, high heat, humidity, and extended sun exposure may place added strain on these musicians.

Thorough physical warm-ups, sufficient rest periods, appropriate sun protection, and adequate hydration are essential in promoting the neuromusculoskeletal health of these musicians.

Future Steps

Now that you've learned about the basics of neuromusculoskeletal and vocal health, we encourage you to keep learning. Do your own research. Browse through the links provided at the end of this document. There's a wealth of information out there, and it's yours to discover.

Conclusion

We hope this resource document has made you think more carefully about your own neuro-musculoskeletal and vocal health. Just remember that all the knowledge in the world is no match for personal responsibility. We've given you the knowledge and the tools; now it's your turn. You are responsible for your behavior in and outside of the music unit. Your day-to-day decisions have a great impact on your neuromusculoskeletal and vocal health, both now and years from now.

Do yourself a favor. Be smart. Protect your body and your voice. Don't take unnecessary risks. Take care of yourself. You owe it to yourself.

Resources – Information and Research

Neuromusculoskeletal and Vocal Health Project Partners

National Association of School of Music (NASM)
http://nasm.arts-accredit.org/

Performing Arts Medicine Association (PAMA)
http://www.artsmed.org/index.html

PAMA Bibliography (search tool)
http://www.artsmed.org/bibliography.html

Medical Organizations Focused on Neuromusculoskeletal and Vocal Health

American Academy of Neurology
(http://www.aan.com)

American Academy of Orthopaedic Surgeons
(http://www.aaos.org)

American Academy of Otolaryngology – Head and Neck Surgery
(http://www.entnet.org)

American Academy of Physical Medicine and Rehabilitation
(http://www.aapmr.org)

American Association for Hand Surgery
(http://www.handsurgery.org)

American Laryngological Association
(http://www.alahns.org)

The American Occupational Therapy Association, Inc.
(www.aota.org)

American Psychiatric Association
(www.psych.org)

American Psychological Association
(www.apa.org)

American Physical Therapy Association
(http://www.apta.org)

American Society for Surgery of the Hand
(www.assh.org)

American Speech-Language-Hearing Association
(http://www.asha.org)

National Center for Complementary and Alternative Medicine
(http://nccam.nih.gov)

Other Resources on Neuromusculoskeletal and Vocal Health

Athletes and the Arts
(http://athletesandthearts.com)

National Association of Teachers of Singing
(http://www.nats.org)