Youth Sport Medicine Injuries in the Performing Arts

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Objectives of Lecture

1. Learn about performance arts medicine

2. Explore the unique injuries of performing arts in dance, music, vocal, and theatre

3. Learn about the psychology of the performing artist

4. Implement preventive care to these athletes in order to prevent burn out and overuse injury
The stage is not merely the meeting place of all the arts, but is also the return of art to life. *Oscar Wilde*

Defn: forms of creative activity that are performed in front of an audience, such as drama, music, vocal, and dance.

The conditions governing these patients’ lives include early exposure to high expectations of excellence, incessant demands for perfection, long periods of intense practicing, fierce competition, and high levels of anxiety associated with performance.

Stats on number of performing arts physicians in USA: unknown number but it is few with most areas concentrated in NYC and SF, and majority in Europe.

Types of coverage for physicians: dance companies, performing arts centers, symphonies, and theatres.
THE PA Compared to Other Sport Adolescent Injury

- Adolescent growth spurt puts kids at risk for injury due to muscle tendon tightness and decreased physisal strength. Present in all types of sports.

- In addition, bone mineralization may lag behind linear bone growth during the pubescent growth spurt, thus rendering the bone temporarily more porous and more prone to injury during this period.

- Older males and pre-pubertal females are at higher risk for MS injury.

- Youth sports are associated with a significant potential for acute injury. With the advent of sports specialization and year-round training, overuse injuries are becoming increasingly prevalent in youth sports.
The Performing Arts

- Over the past 20 years there has been increasing interest in the health problems related to the performing arts. It has been recognized that performing artists have been underserved and that their unique needs have often not been met in the past.

- Thought provoking: There are drama classes, dance classes, music classes, television classes, and hundreds of thousand productions going on world-wide every year and tens of millions of adolescents are participating!
The Performing Arts

Secondary schools, junior highs, and middle schools are the largest single segment of the performing arts in the world!

Support the arts in schools.
Starting in the 6th century BC, the Classical period of performing arts began in Greece and brought in by the tragic poets such as Sophocles. These poets wrote plays which incorporated dance.

In the 15th century performing arts there was a revival as the Renaissance began in Italy and spread throughout European plays.

Some of which incorporated dance were performed and Domenico da Piacenza was credited with the first use of the term ballo instead of danza (dance) for his baletti. The term eventually became Ballet. The first Ballet was in (1581).

17th Century start of opera in Europe
• The instrument through which the dance speaks is also the instrument through which life is saved. Martha Graham 1979

• Dance is the art that combines athleticism with artistry.

• The career of a dancer is short-lived compared to other performing artists. Dancers perform up through late twenties unless they become a teacher or choreographer.
Dance

- In no other profession is the athlete more predisposed to MS injury than in ballet.

- To live in the world of a ballerina or advanced dancer, the average weekly workload is about 30-45 hours per week. This increases with performance season and summer intensives.
Dance

- Dance encompasses various techniques and styles such as jazz, tap, ballet, pointe, hip hop, break dancing, folk, ethnic, ballroom, modern, contemporary, and musical theatre.

- Major dance injuries include those of the hip, knee, foot, and ankle.

- Faulty technique is the cause of MS injury to the dancer.
A study in the Journal of Dance Medicine and Science 2010 defines fatigue as “extreme tiredness, weakness or exhaustion—mental, physical, or both.”

The study states once fatigued, the ability to perform movements requiring complex skill is compromised.

This can lead to poor technique, faulty alignment, inefficient biomechanics, and resultant stress placed on muscles and joints.
Dance Injuries

- Other factors that predispose dancers to MS injuries include: anatomic alignment (patellar anatomy, bad feet), poor training, technical errors (shoes, lighting), unfamiliar choreography or style, environmental factors including floor surfaces, and theatre temperatures.
Dance-The hip

- Ideal turnout demonstrates 180 deg of external rotation starting at the hips and results in the feet being easily placed in 180 deg of floor.

- Many students are unable to attain the perfect turnout because of limitations of the hip → undertucking of the hip

- This posture is done in order to force turnout.

- Limits ROM of hips and actively engages external rotator muscles of the hip

- Places strain on hip flexor muscles and hip labral complex.

- Also causes pain in medial knee and can lead to pronation of midfoot.

- Goal: Tailbone down and core lifted with belly button to spine
Dance-Hip injury
Dance-The knee

- MS Injury due to: PFTS, patellar tendonitis/apophysitis
- Typical dancer’s knee tends to be hyperextended (swayback) with a high, small, poorly developed patella that has potential to sublux laterally.
- There may be different variations in patella and knee anatomy such as patella alta, genu varus and valgum, genu recurvatum, bipartite patella, external tibial torsion, and VMO insufficiency.
- Dancers of the arque (bow legged) or jarrete (knock kneed) have powerful tightly knit muscles with short bellies and long tendons.
- Arque dancers are are remarkable for ability to perform high leaps and quickness.
- The jarrete (knock kneed) dancer has longer and weaker muscle bellies with short tendons. This dancer is most noted for their beauty of position and clarity of movement.
Dance Injury-The knee
Dance-The knee

- Patellar tendonitis/apophysitis
- Due to repetitive jumping/landing and possibly not stretching hamstring in all planes.
- The stretching in all planes is important in adolescents to prevent stretch on patellar tendon at tibial tubercle causing acute apophysitis then leading to Osgood Schlatter’s disease.
The foot and ankle are subject to high incidence of injury and represent 34-62% of all injuries reported.

Females have higher incidence of injury than males as they dance sur les pointes.

En flat: both feet placed on ground, usual position at the barre, in the center, starting position

Demi Pointe: a position on the balls of the foot, half tip-toe

Full Pointe: dancing that is performed on the tips of the toes
Dance-The ankle

- Female ballet dancers en pointe require marked ankle plantar flexion with toes in neutral position relative to the long axis of the foot. This extreme plantar flexion along with the intrinsic muscles and ligaments of the foot and ankle are vital for stability. Inversion ankle sprains are also common.

- Considering menarche, if delayed it is common in ballet and Irish dancers to have increased risk for stress fractures.

- Missed landing from jumps and rolling over lateral aspect of foot while on demi-pointe are 2 common MOI dancers sustain in 5th MT fx.
Dance-Foot Injury

- Repetitive loading of bone causes bony stress reactions/fx.

- **Cause of stress reactions and fractures is multifactorial:** female athlete tetrad (disordered eating, bone density loss, abnormal menstrual cycle, CV disease).

- Most dancer stress fx are in 2\textsuperscript{nd} MT, then 5\textsuperscript{th} MT and can be also found in fibula, tibia, spine, and hip.

- 1\textsuperscript{st} and 2\textsuperscript{nd} MT bear most of weight when dancer in demi-pointe or full pointe position.
Dance-Foot Injury

- FHL Tendinitis (dancer’s tendinitis)
- Usually injured in dancers that do a lot of relevae positions (ballet, pointe jazz, contemporary, rhythmic gymnasts).
- Studies indicate that the muscles crossing at MTPJ work 2.5-3 times harder than those crossing the ankle joint placing especially the FHL tendon at risk for overuse injury.
- Dancers can present with postmed ankle pain, swelling, popping, triggering or locking if nodule forms on the tendon
- Prevention: SD Ballet physicals we have incorporated foot and ankle demo prev exercises of foot intrinsic muscles, ankle ligaments, going through toe/ball/heel for jumps, eccentric exercises for achilles tendon.
Dance: Foot Injury

- Achilles Tendinitis

- MOI: forcing turnout leading to pronation in midfoot and hind foot. Also not going through proper landing of toe/ball/heel and just landing on heels contributes to shortening of achilles tendon leading to injury.

- Prevention: improve technique, loosening of ballet ribbons for those en pointe, use of night splint, eccentric exercises, stretch box at studio or theatre.
Dance

• “In a dancer there is a reverence for such forgotten things as the small beautiful bones and their delicate strength.” Martha Graham.
Dance Injury Prevention

- Proper warm up and cool down especially in conditions of cold temperatures. Education in multi-plane stretching.

- Quality Technique

- A well constructed and quality dance floor

- Careful fitting of the shoes to support feet and prevent deformities like bunions.

- Treating injuries early.

- Physician to inquire what performances or competitions are coming up and what role the dancer plays in the show.
Dance Prevention

• Every angle and motion of the dancer must be precise and perfect.

• Any deviation from this will be evident to the dancer, the instructor, and audience but not necessarily the physician.

• For this reason, collaboration with instructors, therapists, and treating physicians is vital.
• Instrumental musicians are a special risk group for musculoskeletal injuries.

• Orchestral parts are practiced to perfection with an eye toward the first chair.

• **MS injuries result from factors such as:** incorrect posture, nonergonomnic technique, excessive force, overuse, poor lighting, and insufficient rest

• Increasing number of US students up to age 18 are presenting for treatment. Overuse syndrome in the music schools vary from 10-20%.

• Gender is a nonmodiable risk factor for injury in sports and in the PA, it is males who are at increased risk for injury.

• No studies that show risk associated with playing a particular instrument varying by gender.

• Increasing age is associated with increasing risk of injury in sports but no data on injury rates among young performers in the arts.

• Being L handed is a risk factor for injury in the PA.
Music

- Overuse syndrome accounts for 50% of musical instrument player injuries.

- The greatest risk of MS injury occurs when changing a technique or using a new instrument and with prolonged playing with inadequate rest.

- Examples include: practicing for a performance or perfecting a new technically difficult piece.
Music-Common Injuries

- Joint deformity-callous formation due to poor technique
- Joint laxity leading to muscle contraction becomes the primary stabilization of affected joint. Prolonged need for dynamic stabilization ultimately leads to fatigue, pain, and spasm when ligamentous structural support is lacking.
- Hypermobility can lead to synovitis and digital nerve compression
- Joint hypermobility with connective tissue disorders-as many musicians experience laxity in a joint. Decide if pathologic and if need to screen for Marfan’s or Ehlers-Danlos syndrome.
- Trauma-most cases occur outside practice then affects practice of instrument.
Music - Common Injuries

- Most are due to static loading and repetitive activity. Uneven holding of 1 position for many minutes at a time.
- Cervicalgia: violin, viola, percussion, cello
- Upper extremity hand: clarinet, oboe, percussion
Music-Common Injuries

- UE shoulder (RTC) injury: flute
- Forearm tendinitis: violin, viola, cello, woodwinds
- LBP: double bass, bassoon, brass section
- The musician should be examined for overall habitus, fitness, and posture.
Grading Severity of Injury in Musicians

- Grade 1: Consistent pain in one site on playing then resolves when not playing instrument.

- Grade 2: Pain in multiple sites. + TTP, transient weakness or loss of control.

- Grade 3: Pain in multiple sites causing pain with and without instrument use. May have weakness, loss of control, loss of dexterity.

- Grade 4: Grade 3 + ADL’s causing pain

- Grade 5: Grade 4 + loss of capacity of hand bc disabling pain
Prevention in Musicians

• Start early: implement preventive methods in secondary schools as it helps for a long and fulfilling musical career.

• Choosing quality instruments and maintaining their proper working conditions help prevent MS injury.

• Treatment for ergonomic modification and instrument modification is also necessary to decrease injury.

• A team work approach to medicine is vital for our young music students
Vocalists

• Vocal music educators are on the front line of defense against their students' vocal misuse. They see their students regularly and are aware of obvious and sometimes subtle changes in their health and lifestyle.

• The potential for the abuse of vocal cords is always present, regardless of the age of the student, his or her talents, or level of ability.
Vocalists

• Young, elementary school-age children are especially vulnerable to a variety of colds and infections which often result in sore throats, hoarseness, and laryngitis.

• Males are a unique population in this form of the PA.

• Boys from age 7-8 through adolescence have a natural growth of vocal power resulting in increased tone. Junior high age presents with more difficulties in voice than any other age.
Vocal Injury-Functional

- As children grow older—the adolescent years—their voices are subject to remarkable changes.

- In addition, the opportunities for vocal abuse during these years are probably the most prevalent of any in their lives.

- General exuberance, yelling at sporting events or at any social gathering, and improper singing can all, if done to excess or during a period of illness, cause damage to a youngster's voice.
Vocal Injury Types - Functional

- Hoarseness is often the first sign of more than an upper respiratory tract infection; it can indicate a number of different vocal problems.

- Vocal misuse and abuse syndrome. This can be a cause of hoarseness if it comes on unexpectedly or if the voice gives out after speaking.
Vocal Injury Types - Trauma

- Cervical strain/sprain → hoarseness.
- Frequent causes are sports mishaps and bicycle, skateboard, and automobile accidents involving trauma to the Adam's apple.
- Medical diagnosis of laryngeal fracture is critical because damage can cause total obstruction and even death.
- Vocal cord paralysis: can occur as the result of a virus, heart surgery, thyroid surgery, or intubation.
Vocal Injuries-Benign Nodules and Tumors

• Nodules most commonly form due to misuse of voice and trauma. May affect voice quality and breathing patterns.

• Benign vocal lesions are non-cancerous growths of abnormal tissue on the vocal folds. They include "singer's" nodules, isolated polyps, polypoid degeneration (Reinke's edema), and cysts.

• Vocal Fold Nodules: symptoms include chronic or recurrent hoarseness, loss of ability to sing high notes softly, frequent voice breaks, and vocal fatigue. Common in male adolescents.

• Make sure to eval and treat for allergic rhinitis, GERD, and hypothyroidism.
Vocal Injuries-Benign Nodules and Tumors

- They are thought to occur from breakage in a capillary (small blood vessel) in Reinke's space, with leakage of blood, localized edema, → fibrotic polyp.

- Reinke’s space: layer just underneath the surface lining of the vocal fold; composed of cells, special fibers, and other substances (extracellular matrix); has key role in vocal fold vibration
Vocal Hygiene Tips

1. Drink 10-12 glasses of fluids a day, preferably without ice. The best beverage for singers is plain hot water with dashes of lemon and honey.

2. Avoid alcohol and all forms of smoke. Limit spicy foods.

3. Avoid all forms of whispering, including loud "stage" whispers.

4. Avoid throat clearing, yelling, or gargling; the vibrations irritate the vocal cords.

5. Keep environmental temperatures comfortable.

6. Avoid drying medications. If they are necessary, increase intake of fluids. (antihistamines, mint, menthol, liquid medication)
Vocal Hygiene Tips

• 7. Rest the voice completely: for hoarseness, laryngitis, pharyngitis. Take tylenol only.

• 8. While traveling—land or air—keep conversation to a minimum.

• 9. Avoid travel the day of performance, especially before difficult or repeated performances, so that the body can rest.

• 10. See a doctor if throat problems last more than five days, especially if a fever develops, if there is a loss of appetite or fatigue, or if neck glands become swollen or tender.
Vocal Injury Prevention

- The teacher should encourage students, especially during the critical period of voice change, to speak without yelling, to vocalize (speaking and singing) in a comfortable middle vocal range, to sing without straining, and to rest if they become hoarse.

- If proper habits are developed during the adolescent years, vocal cords are generally able to withstand the rigors of adult life and to operate freely and efficiently.
Vocal Injury Prevention

• Develop good technique and maintain a healthy voice:
  • 1. Warm-up the voice every day before speaking and singing.
  • 2. Practice efficiently and carefully.
  • 3. Correct technical problems early
  • 4. Correct specific vocal habits that hamper good technique:
    • a. Mouth/jaw not open enough.
    • b. Vowels -- example: E too stretched, restricting mouth opening.

• Relax the tongue to decrease muscular tension in the jaw.
Theatre

- Injury to these athletes have different hazards but can be very serious.
- Theatre Arts is a combination of dancing, acting, and singing with the special use of costuming specifically designed for movement which are all executed in a planned fashion.
Factors Affecting Stage Injury

- The design and quality of stage
- Lighting
- Props
- Costumes
- Temperatures
Theatre Injuries

- Knee: contusions, patellar tendinitis/apophysitis.
- Ankle: sprains, fractures
- Heat illness due to costumes
- Overuse injuries if have a physical scene (fights)
Theatre Injuries

- Many actors and actresses are completing their own stunts and much athleticism is involved in their scenes.

- There is repetition of these stunts or physical scenes including learning the piece, practicing, and performing to try to get it perfect.
Theatre Injury Prevention

• Important to discuss with the child and parent about the stage and lighting.

• Inquire about the child’s role and amount of physical activity.

• Educate child and parent about being familiar with the stage crew.

• Practice same precautions of a vocalist as actor/actress has to speak on stage.
Psychology of the performing artist

- Success in the PA demands an exclusive focus of time and intellectual and emotional energy.

- Sacrifice of typical social experiences during adolescence in favor of career advancement has lead to less coping skills with stress.

- In essence, a child is forced to grow up quicker with learning quick about goal setting and achievement, prioritizing, and learning about expectations. They learn about success and failure very fast.

- In turn, these demands and expectations placed on adolescents unfold to applying for daily life. Many kids outside the PA are not at this level.
Psychology of the performing artist

1. Each student brings different mindset.

2. They bring a different physical body, emotion reactions to given situations.

3. Each student has different hidden desires, expectations, interactions with others

4. The students also have different experiences in their family and school backgrounds.
Psychology of performing artists

- Depression can occur when there is a loss of opportunity, popularity, self-esteem, or physical integrity due to illness/injury.

- Anxiety can develop because of high expectations, performance, and auditions.

- Mental s/s include: pronounced apprehension, dread of failure, losing control, and being disgraced.

- Also including: muscle tension, tremors, respiratory distress, palpitations, memory loss, and dry mouth and throat.

- Vital for physicians to follow these athletes closely as may lead to substance abuse.
Physician advice to parents for the young performing artist

- Value in youth sports is to allow a person to grow while having fun
- Winning is secondary but can always have stage moms or dads
- A lesson in balance of competition and cooperation
- As skill level increases, so does the level of competition and outlook on winning
- Helps to boost self esteem
- Role in parenting of the young athlete: encourage, support, praise, motivate, always love
- Recognized set of guidelines for youth sports: The American Alliance for Health, Physical Education, Recreation and Dance developed Bill of Rights for Young Athletes.
Bill of Rights for Young Athletes

- Right to participate in sports
- Right to participate at a level corresponding to each child's maturity and ability
- Right to have qualified adult leadership
- Right to play as a child and not as an adult
- Right of children to share in the leadership and decision-making of their sport participation
- Right to participate in safe and healthy environments
- Right to proper preparation for participation in sports
- Right to an equal opportunity to strive for success
- Right to be treated with dignity
- Right to have fun in sports
Summary

- Younger children have fewer injuries than older children.
- Rate of injury increases with age until high school ages: due to post puberty and being stronger, faster, larger.
- After puberty, some differences occur within the female athlete and male athletes depending on what type of PA they participate.
- The level of skill and competition is so above what it was even 5 years ago and kids are training for longer hours (30-45) per week above school. It is evident on popular shows like America’s got talent, SYTYCD, American Idol, Dance Mom’s, local commercials, movies featuring kids, pop teen icon singers, young musicians in symphonies. The talent bar has been raised, adolescents are more at risk for injuries, and physicians are seeing more kids in the office for injury.
Concluding thoughts

- Performing artists make great sacrifices both physically and mentally to bring the world immeasurable beauty.

- As physicians, it is our responsibility to care for them in the most comprehensive and compassionate manner possible while being honest to inform them of their treatment options.

- Performing artists provide many of the most memorable moments in our lives, and art is probably the most potent healing force known to humanity.
• Be “en pointe” to recognize those who participate in the Performing Arts as true athletes and the “centerstage” of your future patients.
Bonus!
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