



Dance Medicine: *An overview*

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Objectives

- Overview of Performing Arts & Dance Medicine
- Dance Medicine: Its culture & traditions
- Intrinsic & Extrinsic Factors
- Common Injuries in Dancers
- Treatment Consideration
- Summarize
- Resources

“Dance is an artist’s job, not an athlete’s job.”

~ unidentified ballet coach at the Royal Ballet

Overview of Performing Arts Medicine

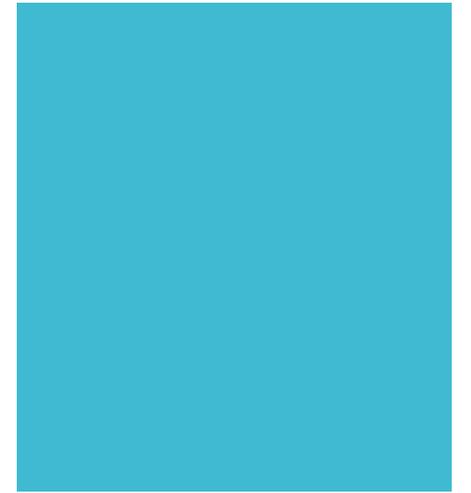
- Performing Arts & Dance Medicine are one segment of the Sports Medicine umbrella.
- Performing Arts Medicine:
 - Music: vocalist, instrumentalist (wind, brass, strings, keys, percussion)
 - Actors: Stage theatre, Musical Theatre, Circus,
 - Dance: Ballet, Modern, Tap, Contemporary, Lyrical, Hip-Hop, Ballroom, Acrobatics (Acro)

Dance Medicine: Culture & Traditions

- Dance Culture and Traditions.
 - Artist vs Athlete
 - Aesthetics over-ride all other considerations
 - Feet are everything- gestural extremity
 - Movement demands in a larger range of motion
 - Its training is based in art not in scientific traditions
 - Loyalty vs Competition
 - Dance goals are not motivated by championships or trophies
 - Its about expressivity of the artform not about competitions
 - Very loyal to their artist directors and studios
 - Suspicious of outsiders
 - Economics of dance
 - Short careers with low pay
 - Non-profit organizations
 - Limited recognitions or endorsements

Cultural Biased in Dance

- Perfectionism: body image, technique
- Technique: push farther and higher
- Flexibility: more is better
- Never stop: the show must go on
- Poor understanding of basics of training



Dancers: treating a different populations

- Adolescent Dancers
 - Growth spurts: change in body doesn't adapt to the continued load and demand of progressing dance training
 - On Pointe too soon?
 - Poor understanding of core and turnout: are they forcing their turnout?
- Extreme Range of Motion
 - Generalized hypermobility
 - SLR >120
 - Ankle PF: 90 combined at talocrural & midfoot
 - 1st Ray MTP: 90 for demi releve
- Precarious Balance & Positions:
 - Upright posture, Upper extremity positions, en pointe, partnering

Intrinsic & Extrinsic Factors

- Intrinsic Factors
 - Sex, age, weight, height,
 - Personality type
 - Prior injury
 - Flexibility & hypermobility
 - Ability to jump
 - Turn out: hip structure (anteversion & retroversion)
 - Cardiovascular conditioning
- Extrinsic Factors
 - Technique and choreography
 - Dance style
 - Equipment, shoes, costumes
 - Stage, floor and environment
 - Level of skill
 - Partnering
 - Organizational factors



Common Injuries in the Dance population

- Overuse Injuries the most common.
- Spine: spondylolysis pars fracture, sacroiliac joint dysfunction
- Hip injuries: snapping hip syndrome, hip impingement, labral tears, hip flexor tendonitis, hip bursitis
- Foot and ankle injuries: Achilles tendonitis, Flexor Hallux Longus tendonitis, trigger toe and ankle posterior impingement
- Knee injuries: patellofemoral pain syndrome

- Dancers are also likely to develop arthritis in the knee, hip, ankle and foot.

Overuse Injuries

- Fatigue: injuries occur at the end of the season, end of class, end of performances
 - Altered joint stability > motor control
 - Altered motor recruitment pattern or order
 - Increase risk of tissue failure
- Ergonomics demands & repeated movements:
 - Jumps as an example
 - >200 jumps per class
 - 56% single leg landing
 - 14x the body weight

Liederbach et al 2006

Spine Injuries

- Common spine injuries:
 - Spondylolysis pars fracture
 - Sacroiliac joint dysfunction



- Pathogenesis of spine injuries in dancers:
 - Repetitive extension movement : repetitive cambre, arabesque
 - Pain-free to return to extension movements in dance
 - Physical therapy consist of core stabilization, neutral spine and correcting faulty mechanics
 - Sacral, pelvis instability due to extreme stretching
 - Dancers like «pop » their SI joints

Hip Injuries

- Common Hip Injury
 - Snapping hip syndrome
 - Hip femoralacetabular impingement
 - Hip labral tears
 - Hip flexor tendonitis
 - Hip bursitis
- Pathogenesis of hip problem in dancers
 - Turnout
 - Expansive range of motion with high strength demands at end range
 - Repetitive functional F/E-ABERS from Pose to arabesques
 - Constantly overstressing the anterior capsule with weak glutes will decrease the acetabular alignment

Knee Injuries

Patellofemoral pain syndrome

- Common in the adolescent dancer
 - Turn out: 45-60° from the hip, 5° from the knee, 25° from the ankle
 - Plie: 5-7x Bodyweight (BW) at the knee, 3x in demi, 7-9x in grande
 - Usually due to faulty alignment
 - Weakness in the glutes, hamstrings and quads with imbalances present
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- Have the dancer reduce their turnout during the acute phases, help them to adjust their alignment from hip, knee and ankle to reduce stressers.



Foot & Ankle Injuries

- Common Foot & Ankle Injuries in Dancers
 - Achilles tendonitis
 - Lateral Ankle Sprain
 - Flexor Hallux Longus tendonitis/Trigger Toe
 - Posterior ankle impingement
 - Lis Franc's sprain or fracture
 - Stress fractures: metatarsals, tibia, sesamoids



Pathogenesis of Foot & ankle Injuries

- Forceful plantar flexion of the foot
 - Inadequate PF $<90^\circ$ will result on WB in the calcaneus en pointe = posterior loading of the ankle which leads to posterior ankle impingement, Achilles and FHL tendon injury
- Hyperextension of the knee
 - Dancers have an average of 10° of hyperextension of the knee
 - Contributes to finding of less DF at the ankle among dancers
 - This leads to increase compression forces during landing
- Forces Turnout
 - Increase abnormal pronation
 - Miserable malalignment = ankle, knee or hip problems
 - DF of 1st ray may limit PF, or also overloading of 1st ray will increase strain on FHL
- Walking with a toe out gait
 - Changes pattern from ER of the hindfoot with poor toe off position

Treatment & Evaluation Considerations

- Evaluation Considerations
 - Hypermobility and larger ROM common
 - Functional Examination
 - Positions: 1st, 2nd and 5th positions
 - Plie, releve, grande plie, pirouette, petite allegro
- Phases of Rehabilitation & Return to Dance progression
 - Phase 1: Begin with a modified barre that is one-half the duration and intensity of class. No pointe work, no jumping, no center
 - Once a full barre is discomfort-free, have the student participate with full barre and modified center work. No pointe work, no jumping, no petite or grande allegro
 - Once a full barre and full center work are achieved, discomfort-free, the student can add petit allégro. In some cases, ok to start pointe work at barre as described in step 1.
 - Once a full barre, full center work and petit allégro are all pain-free, the student can add grand allégro. Once a full barre, full center work and all jumps are comfortable, the student can progress pointe work.
 - Pointe work will then progress back through the following 4 phases.

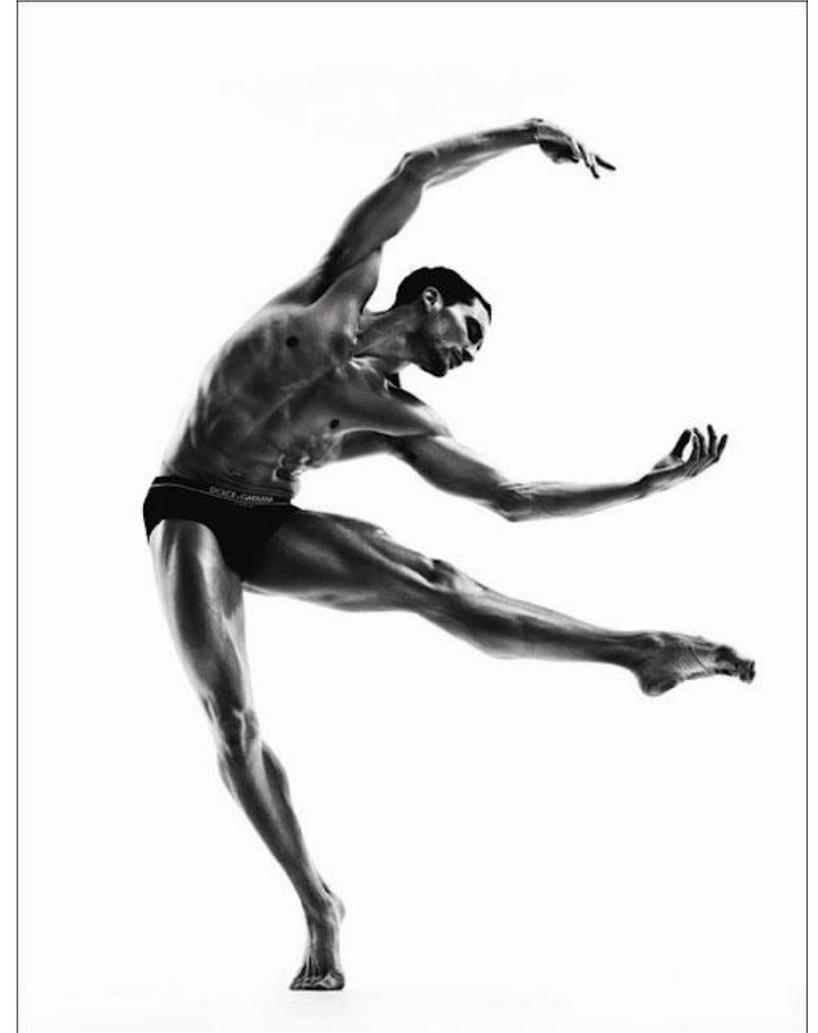
Summarize

Aesthetics will over-ride all other considerations!

The show must go on!

Don't tell them to stop dancing- activity modifications with progress through return to dance phases appropriate for the injury.

Functional examination of the dancer in releve, plie in 1st, 2nd and 5th positions essential for diagnosis the dancer



Resources

- Performing Arts Medical Association (PAMA): affiliated with ACSM
 - Artsmed.org
 - Medical for Performing Artist
- International Association of Dance Medicine & Science (IADMS)
 - Iadms.org
 - Journal of Dance Medicine & Science
- Dance USA medical task force
 - Danceusa.org
- Performing Arts Special Interest Group (PASIG), Orthopedic Section of the APTA



Resources: terminology

- Ballet has ten basic French terms that you should recognize. These include:
 - The five positions of the feet (first through fifth position)
 - Plié (demi and grand plié—a bend at the knees)
 - Cambré (to bend at the waist)
 - Relevé (to rise onto the balls of the feet or toes)
 - Tondu (a stretch of the pointed foot)
 - Passé (to pass from one position to another, or retiré)
 - Developpé (a large lower extremity movement in the air)
 - Grand battement (to kick)
 - En tournant (to turn)
 - Sauté (to jump)

Thank you!

Questions?



References

- Junck E, Richardson M, Dilgen F, Liederbach M; (2017) J Dance Med Sci. A Retrospective Assessment of Return to Function in Dance After Physical Therapy for Common Dance Injuries.
- Bronner S, McBride C, Gill A; (2018) J Sports Sci. Musculoskeletal injuries in professional modern dancers: a prospective cohort study of 15 years.
- Liederbach M, Garrick J, et all; (2008) Proceedings Principles of Dance Medicine: Clinical Management of the Dancer Patient, NYU, New York, NY.
- Micheli LJ, Gillespie WJ, Walaszek A. (1984) Clin Sports Med. Physiologic profiles of female professional ballerinas.
- Filipa AR, Smith TR, Paterno MV, Ford KR, Hewett TE. (2013) J Dance Med Sci; Performance on the Star Excursion Balance Test predicts functional turnout angle in pre-pubescent female dancers.
- Liederbach M, Hagins M, Gamboa JM, Welsh TM (2012) J Dance Med Sci. Assessing and Reporting Dancer Capacities, Risk Factors, and Injuries: Recommendations from the IADMS Standard Measures Consensus Initiative.
- Garrick J, Requa RK (1993) Am J Sports Med. Ballet injuries: An analysis of epidemiology and financial outcome.
- Vosseller JT, Dennis ER, Bronner S. (2019) J Am Acad Orthop Surg. Ankle injuries in dancers.
- Rietveld ABMB, Hagemans FMT, Haitjema S, Vissers T, Nelissen RGHH. (2018) J Dance Med Sci. Results of Treatment of Posterior Ankle Impingement Syndrome and Flexor Hallucis Longus Tendinopathy in Dancers: A Systematic Review.