Osteoarthritis and the Athletic Trainer: A Public Health and Chronic Disease Management Approach

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Disclosure

The views and opinions expressed are those of the presenter and do not reflect the official policy of the Department of the Army, the Department of Defense, or the U.S. Government.

Overview

- What is osteoarthritis (OA) and what is the impact of OA?
- What are the risk factors for OA?
- Why should athletic trainers (ATs) care about OA?
- Review the chronic disease management model for OA.
- Discuss potential roles ATs might have in the prevention and management of OA.
- Review EBP Recommendations for OA Management and the CDC Public Health Agenda for OA.

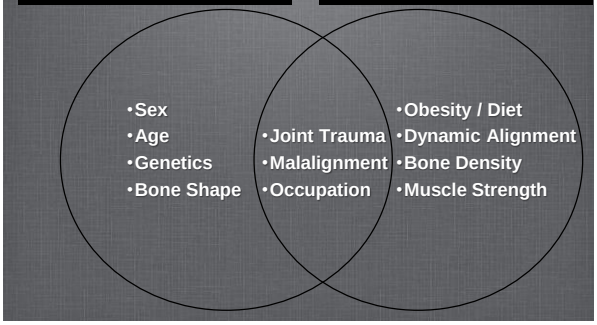
What is Osteoarthritis?

Osteoarthritis (OA) is caused by a combination of genetic, local mechanical stresses, and/or systemic factors that lead to joint cartilage loss, bony overgrowth and other bone changes, and alterations in ligaments, menisci and muscles.

The Impact of OA

- Arthritis is the leading cause of disability in the U.S.
- OA is the most common form of arthritis and over 27 million Americans are affected by this chronic condition.
- An estimated 632,000 joint replacements due to OA are performed annually costing $30 billion.
- OA results in over 11 million outpatient visits annually.
- Estimated that OA results in over $13 billion in lost productivity annually.

What are the Risk Factors?



OA Only Affects Old People

- OA prevalence starts rising sharply at age 45, affecting the large working age population.
- Early onset OA can develop within ten years of a major joint injury (PTOA).
- A teenager injured at age 15 could have PTOA as early as age 25 or 30. *(Roos. Osteoarthritis Cartilage. 1995)*

What is PTOA?

- Post-traumatic osteoarthritis (PTOA) is a unique form of OA that is associated with acute traumatic joint injury.
- The disease is likely to follow a shorter time course because of the more rapid progression in disease observed following injury.
- PTOA typically affects people at a much younger age.

The Impact of PTOA

- Estimated 12% of OA due to post-traumatic onset *(Brown et al. J Ortho Trauma. 2012)*
- Lower extremity PTOA costs ~$3 billion/year in direct health care expenses.
- Indirect costs and disability adjusted life years are significantly higher.
- Increased risk for early primary and revision total joint replacement surgery.

OA and the AT

Why should athletic trainers be concerned about OA?

Link et al., 2003

Joint Injuries and OA

Acute Traumatic Joint Injuries are a Common Problem

PTOA IS A COMMON OUTCOME

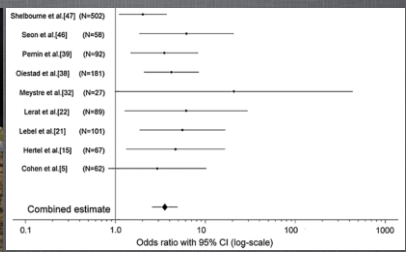
Jonathan Daniel - Getty Images

Joint Injuries and OA

- Nearly 33% of shoulders examined with CT prior to initial shoulder stabilization had signs of OA, with the number of prior instability events being associated with degenerative changes. (Ogawa et al, J Shoulder Elbow Surg; 2006;15(1):23-29)
- Individuals in The Clearwater Osteoarthritis Study were 7.4 (95% CI: 5.9, 9.4) times more likely to develop OA during follow-up. *(Wilder et al, Osteoarthritis Cartilage. 2002;10:611-16)*
- Among female soccer players, 82% had radiographic changes in the knee 12 years following ACL injury and 51% had OA by age 31. *(Lohmander et al, Arthritis Rheum. 2004;50(10):3145-52)*

Joint Injuries and OA

- OA at 10-12 years after an injury
- 16% w/ ACL reconstruction w/ no meniscectomy
- 50% w/ ACL reconstruction w/ meniscectomy



Joint Injuries and OA

PRIMARY PREVENTION IS CRITICAL

Review

Editor's choice
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Specific exercise effects of preventive neuromuscular training intervention on anterior cruciate ligament injury risk reduction in young females: meta-analysis and subgroup analysis

Dai Sugimoto,[1,2,3,4,5] Gregory D Myer,[1,3,4,6,7] Kim D Barber Foss,[3,4] Timothy E Hewett[3,4,5,6,7,8]

Sports and OA Risk

- Most sports are safe or even protective for OA. *(Urquhart DM et al., Med Sci Sports Exerc, 2011)*
- Men in soccer and certain high-level sports may be at increased risk for hip or knee OA. *(Driban et al, J Athl Train. 2014; Michaelsson et al. PLOSOne. 2011; Tveit et al. Am J Sports Med. 2012)*

Former athletes with more knee OA	Increase in odds of having knee OA
Elite male competitive weightlifting	6.9 (3.3, 14.5)
Elite male wrestling	3.8 (1.8, 8.0)
Elite and non-elite male soccer	3.5 (2.5, 4.8)
Elite male long-distance running	3.3 (1.4, 7.5)

Sports and OA Risk

- High level long-distance skiers are at high risk for knee and hip OA. *(Michaelsson et al. PLOSOne. 2011)*
- Is it the sport, the amount of training, high volume repetitive loading, injuries, or a combination of factors?
- There is a lack of data among female athletes.
- There is a lack of data among former college and HS athletes.

Physical Activity and OA Risk

- Habitual running is not related to OA later in life (Lo et al, 2014)
- Habitual running while having OA is not related to worsening symptoms or disease (Lo et al, 2015)
- Physical activities with high volume repetitive loading may increase the risk of OA, specifically in the presence of other risk factors.
- There is a lack of data on military service members.

Military Service and OA Risk

ARTHRITIS & RHEUMATISM
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DOI 10.1002/art.30498
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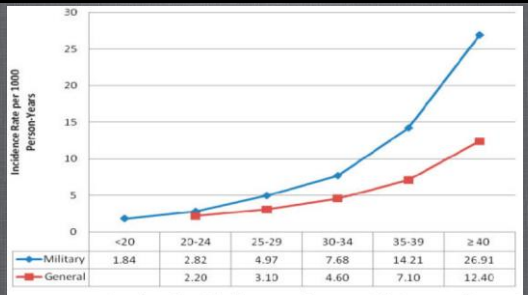
Incidence of Physician-Diagnosed Osteoarthritis Among Active Duty United States Military Service Members

Kenneth L. Cameron,[1] Mark S. Hsiao,[1] Brett D. Owens,[1] Robert Burks,[2] and Steven J. Svoboda[1]

Military Service and OA Risk



	<20	20-24	25-29	30-34	35-39	≥40
Military	1.84	2.82	4.97	7.68	14.21	26.91
General		2.20	3.10	4.60	7.10	12.40

Figure 2. Comparison of unadjusted incidence rates for osteoarthritis between military and general populations by age. Incidence rate data for the 40–44-year and 45–49-year age groups in the general population studied by Kopec et al (6) were combined for the ≥40-year age group.

Military Service and OA Risk

Osteoarthritis and the Tactical Athlete: A Systematic Review

First Author	Year	Type of Tactical Athlete	Gender	Age	Type of OA	Outcome	Estimate	Ratio
Vingard E	1991	Firefighters	Males	38-78	Knee	CI	Risk Ratio	2.93 (1.32,5.46)
Vingard E	1991	Firefighters	Males	38-78	Hip	CI	Risk Ratio	2.52 (1.88,4.64)
Cameron KL[a]	2011	Active Duty US Military	Both	20-24	Any OA	IR	Rate Ratio	1.26 (1.16,1.37)
Cameron KI[a]	2011	Active Duty US Military	Both	25-29	Any OA	IR	Rate Ratio	1.58 (1.48,1.70)
Cameron KI[a]	2011	Active Duty US Military	Both	30-34	Any OA	IR	Rate Ratio	1.67 (1.58,1.77)
Cameron Kla	2011	Active Duty US Military	Both	35-39	Any OA	IR	Rate Ratio	2.01 (1.92,2.09)
Cameron Kla	2011	Active Duty US Military	Both	≥40	Any OA	IR	Rate Ratio	2.17 (2.12,2.22)
Scher DL[b]	2009	Active Duty US Military	Males	20-29	Hip	IR	Rate Ratio	NA
Scher DL[b]	2009	Active Duty US Military	Males	30-39	Hip	IR	Rate Ratio	4.76 (1.31,30.31)
Scher DL[b]	2009	Active Duty US Military	Males	40-49	Hip	IR	Rate Ratio	6.30 (2.46,23.16)
Scher DL[b]	2009	Active Duty US Military	Males	20-49	Hip	IR	Rate Ratio	3.72 (1.71,10.16)
Scher DL[b]	2009	Active Duty US Military	Female	20-29	Hip	IR	Rate Ratio	NA
Scher DL[b]	2009	Active Duty US Military	Female	30-39	Hip	IR	Rate Ratio	18.32 (3.26,725.89)
Scher DL[b]	2009	Active Duty US Military	Female	40-49	Hip	IR	Rate Ratio	NA
Scher DL[b]	2009	Active Duty US Military	Female	20-49	Hip	IR	Rate Ratio	37.40 (6.70,1478.92)
Murray-Leslie CF	1977	Veteran Military Parachutist	Males	23-70	Knee	PR	Odds Ratio	6.10 (2.00,20.56)
Murray-Leslie CF	1977	Veteran Military Parachutist	Males	23-70	Lumbar	PR	Odds Ratio	1.57 (0.62,4.55)
Aydog ST	2004	Active Duty Military Pilots	Males	31-35	Cervical	PR	Odds Ratio	1.76 (0.89,3.63)
Aydog ST	2004	Active Duty Military Pilots	Males	31-35	Lumbar	PR	Odds Ratio	1.49 (0.63,3.70)

Cameron KL, Driban JB, Svoboda SJ. J Athl Train. In Press.

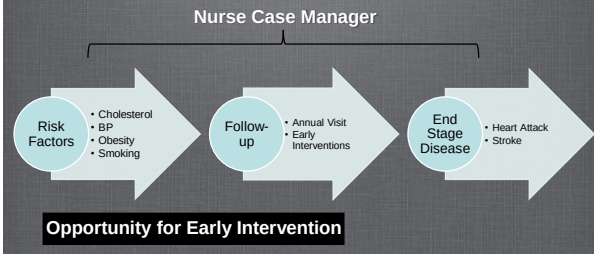
Osteoarthritis

Why do we see significantly higher incidence rates for OA in military service members?

- Acute traumatic joint injuries are endemic within military populations and these injuries likely lead to PTOA.
- The physical training and occupational demands placed upon military service members require a significant amount of repetitive bending, squatting, kneeling, and lifting.
- While military service members are required to meet minimum height and weight standards, a modern combat load can range from 52 pounds to well over 100 pounds.

Managing Chronic Disease

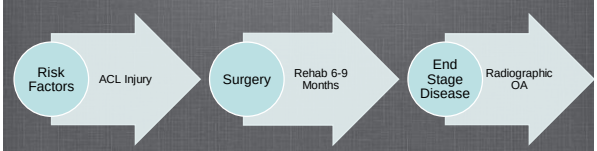
The Chronic Disease Management Model for CVD



Opportunity for Early Intervention

Managing Chronic Disease

The Chronic Disease Management Model for PTOA

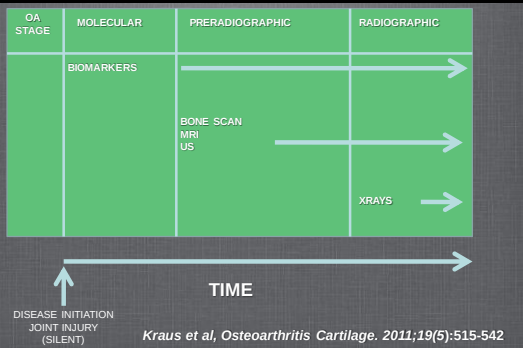


Come back and see me when you need your knee replacement

Traditional Management Model

- Traditionally, the management of acute traumatic joint injuries has terminated when patients are deemed fit to return to activity.
- Treatment has focused on restoring anatomic structures and initial functional capabilities through surgical repair, and patients without complications are typically discharged from follow-up care at 6-9 months post-surgery.
- However, these injuries are the starting point for a cascade of progressive degenerative joint changes that, over the course of several years, lead to chronic pain and loss of function, resulting in physical limitations that affect both physical performance and activities of daily living.

The Clinical Course of PTOA



Kraus et al, Osteoarthritis Cartilage. 2011;19(5):515-542

A New Vision for Chronic Osteoarthritis Management

Bone and Joint Initiative USA

A Call to Action from the Chronic Osteoarthritis Management Initiative (COAMI)

September 2012

Missed Opportunities to Detect and Treat Osteoarthritis (OA)

Imagine if the trigger for treating heart disease were a first heart attack, or for treating hypertension, a stroke. For some patients, these debilitating and often deadly symptoms are indeed the first signs of trouble. However, the treatment goals for these and other chronic conditions is to detect and modify risk factors early, before symptoms appear, so that the disease's devastating outcomes can be prevented altogether.

Not every case of Osteoarthritis (OA) can be prevented, but the Chronic OA Management Initiative (COAMI) believes that a significant degree of the pain and disability caused by OA can and should be prevented or ameliorated.

Secondary Prevention

http://www.usbji.org/sites/default/files/COAMI%20Call%20to%20action.pdf

AOA

THE AMERICAN ORTHOPAEDIC ASSOCIATION

Leadership in Orthopaedics since 1887

AOA Critical Issues

Osteoarthritis: From Palliation to Prevention

AOA Critical Issues

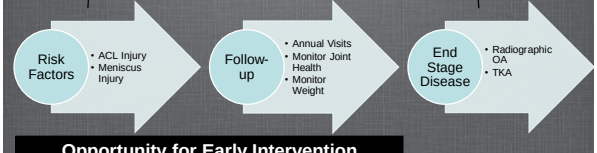
Constance R. Chu, MD, Michael B. Millis, MD, and Steven A. Olson, MD

Osteoarthritis is a leading cause of disability. The traditional focus on late-stage osteoarthritis has not yielded effective disease-modifying treatments. Consequently, current clinical care focuses on palliation until joint replacement is indicated. A symposium format was used to examine emerging strategies that support the transformation of the clinical approach to osteoarthritis from palliation to prevention. Central to this discussion are concepts for diagnosis and treatment of *pre-osteoarthritis*, meaning joint conditions that increase the risk of accelerated development of osteoarthritis. The presentation of translational and clinical research on three common orthopaedic conditions—anterior cruciate

Managing Chronic Disease

The Chronic Disease Management Model for PTOA

Athletic Trainer as Case Manager/Gatekeeper



Opportunity for Early Intervention

Nelson et al. Sem Arthritis Rheum. 2014.

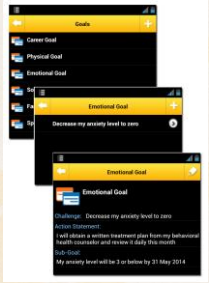
- **Education & Self-Management**
- **Low Impact Aerobic Exercise**
- **Weight Management**

Using a Telehealth Platform to Deliver Innovative Therapeutic Care for Military Service Members at High Risk for Post-traumatic Osteoarthritis

FY15 AMEDD Advanced Medical Technology Initiative (AAMTI) Project

MHCE/mCare Is:

- ✓ Integrated system with a mobile application component
- ✓ Bi-directional synchronization of patients and providers/care team members over distance (synchronous and asynchronous)
- ✓ Secure, HIPAA compliant mobile messaging with FIPS-140-2 certified encryption
- ✓ Leverages a Bring Your Own Device (BYOD) model
- ✓ Mobile Device "Neutral" (Android, Blackberry, iOS, JAVA, Windows Mobile, etc..)
- ✓ A Defense Business Certification (DBC) credentialed system
- ✓ Longitudinal database captures trends and potential for cause – analysis
- ✓ Escalation triggers automatic alerts to care team
- ✓ Awarded one of the Army's Greatest Inventions for 2010

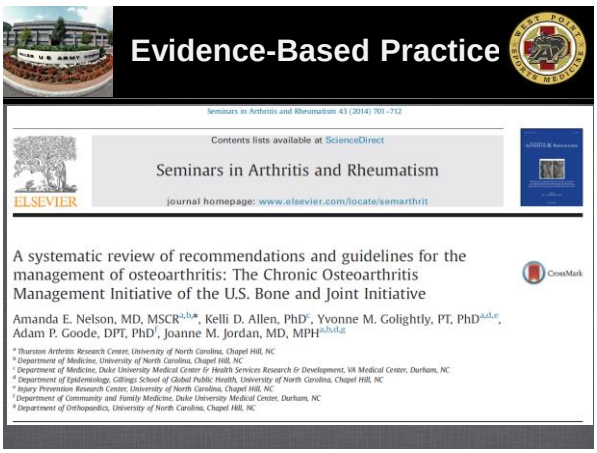


Background:
Mobile Health Care Environment (MHCE) System/ mCare App

Information flow

Data encrypted at rest and in transit
Supports run time and all major OS environments
500,000+ bi-directional transactions to date reviewed under research protocols

Evidence-Based Practice



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ELSEVIER

A systematic review of recommendations and guidelines for the management of osteoarthritis: The Chronic Osteoarthritis Management Initiative of the U.S. Bone and Joint Initiative

Amanda E. Nelson, MD, MSCR[a,b,*], Kelli D. Allen, PhD[c], Yvonne M. Golightly, PT, PhD[a,d,e], Adam P. Goode, DPT, PhD[f], Joanne M. Jordan, MD, MPH[a,b,d,g]

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Summary Recommendations

"Provide or refer patients to self-management programs; provide education, regular contact to promote self-care, joint protection strategies, and individualized treatment plans to patients with OA."

Nelson et al, Seminars in Arthritis and Rheumatism. 2014;43(5):701-712

Summary Recommendations

"Patients should be advised to engage in low-impact aerobic exercise (land or water based), and if overweight to lose weight; consideration can be given to range of motion/flexibility exercises, exercise in combination with manual therapy, endurance strengthening exercises, and physical/occupational therapy referral."

Nelson et al, Seminars in Arthritis and Rheumatism. 2014;43(5):701-712

Summary Recommendations

"Walking aids and other assistive devices to improve activities of daily living are recommended for OA patients as needed. Based on current guidelines, there is inconclusive evidence for bracing or medial or lateral heel wedges for knee OA, and splints for thumb base OA."

Nelson et al, Seminars in Arthritis and Rheumatism. 2014;43(5):701-712

Summary Recommendations

"Thermal modalities are recommended for hand, knee, and hip OA, therapeutic ultrasound is not recommended for use, and insufficient evidence currently exists to provide a general recommendation regarding acupuncture, Tai Chi, or TENS."

Nelson et al, Seminars in Arthritis and Rheumatism. 2014;43(5):701-712

Summary Recommendations

"Joint replacement is recommended for appropriate patients with knee or hip OA. Arthroscopy with debridement is not recommended for the management of symptomatic knee OA."

Nelson et al, Seminars in Arthritis and Rheumatism. 2014;43(5):701-712

Summary Recommendations

"Acetaminophen/paracetamol should be used as first-line therapy in symptomatic OA. Second-line agents should include topical agents (capsaicin and topical NSAIDs) and oral NSAIDs (with appropriate risk stratification and employment of gastroprotective strategies). For refractory symptoms, tramadol is recommended, and consideration can be given to opioids or possibly duloxetine."

Nelson et al, Seminars in Arthritis and Rheumatism. 2014;43(5):701-712

Summary Recommendations

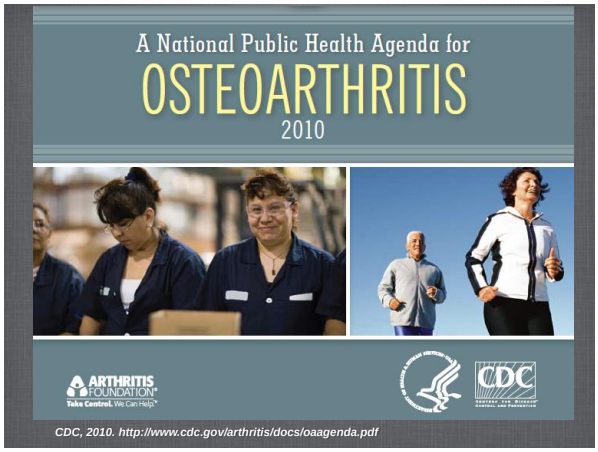
"Intra-articular corticosteroids are recommended for knee and hip OA; insufficient evidence currently exists to provide a general recommendation regarding intra-articular hyaluronans."

Nelson et al, Seminars in Arthritis and Rheumatism. 2014;43(5):701-712

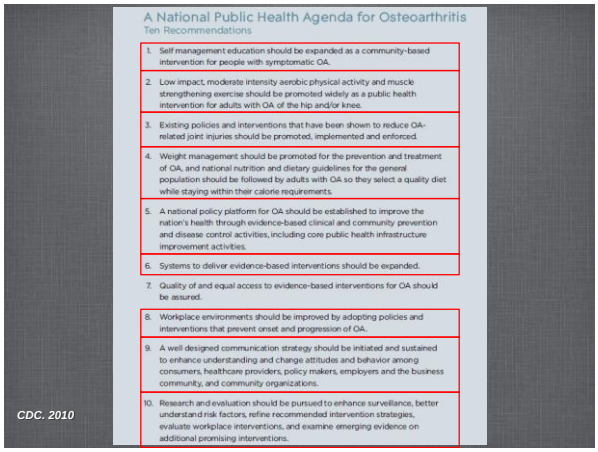
Evidence-Based Practice

"There is essential agreement on many recommendations for OA management across multiple societies making such recommendations. There is not a lack of quality guidelines, but rather a deficit in dissemination and implementation of the recommendations."

Nelson et al, Seminars in Arthritis and Rheumatism. 2014;43(5):701-712



CDC, 2010. http://www.cdc.gov/arthritis/docs/oaagenda.pdf



CDC, 2010

A public health intervention is an activity that prevents disease, injury or disability or promotes health in a group of persons. These activities are distinguished from individual clinical interventions.

Recommended Interventions for OA

Athletic Trainers can play a critical role in the implementation of public health interventions for OA

Self management education should be expanded as a community-based intervention for people with symptomatic OA.

Existing policies and interventions that have been shown to reduce OA-related joint injuries should be implemented and enforced.

Low impact, moderate intensity aerobic physical activity and muscle strengthening exercise should be promoted widely as a public health intervention for adults with OA of the hip and knee.

OA & The Role of The AT

- Primary prevention
  - *Movement assessment*
  - *ACL and lower-extremity injury prevention.*
  - *Weight management/Exercise prescription*
  - *Advocacy*
- Secondary prevention (Following traumatic joint injury)
  - AT as case manager/gatekeeper
  - Monitor joint health over time
  - Education/Self-management
  - *Weight management/Exercise prescription*
  - *Therapeutic modalities*
  - *Monitor compliance*

ATs and OA

Athletic Trainers' ATOAC Osteoarthritis Consortium

@atoac

ATOAC Recommendations

- Educate athletic trainers and athletic training students through entry-level education and continuing education programs about OA and the common risk factors for this debilitating disease that are seen in young athletic and physically active populations commonly treated by athletic trainers.
- Athletic trainers should support and implement evidence-based primary injury prevention interventions to reduce the risk of acute traumatic joint injuries, which will in turn reduce the risk of OA.

ATOAC Recommendations

- Athletic trainers should counsel patients with joint injuries about their risk of OA and strategies to regularly monitor changes in joint health over time.
- Athletic trainers should counsel patients with joint injuries about common modifiable risk factors for OA and self-management strategies that may mitigate OA risk or progression.
- Athletic trainers should be knowledgeable of and apply existing guidelines and recommendations for managing OA in high risk patients following joint injury (e.g., Nelson et al).

ATOAC Recommendations

- Athletic trainers should support the top 10 recommendations outlined in the CDC National Public Health Agenda for OA.
- Athletic trainers should support the Chronic Osteoarthritis Management Initiative (COAMI) and recommendations to treat individuals with a history of joint injury as a high risk patient population for subsequent OA.

Strategic Partnerships

COAMI

Athletic Trainers' ATOAC Osteoarthritis Consortium

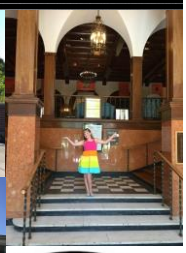
OA OSTEOARTHRITIS ACTION ALLIANCE — Advancing Osteoarthritis Awareness, Resources and Education

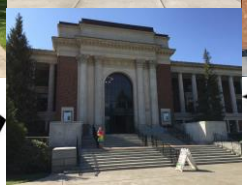
Summary

- OA places a significant burden on the U.S. population.
- 12% of all OA cases are attributable to traumatic joint injury.
- Innovative chronic management models for OA (e.g., COAMI) are beginning to emerge and ATs have the potential to play a critical role in developing and implementing these models and systems of care.
- There is no lack of consensus on management strategies for OA across professional organizations; however, these guidelines are not consistently disseminated or implemented clinically.
- ATs can play a significant role implementing and advancing the 2010 National Public Health Agenda for OA.

Thank You

GO BEAVERS!!





Questions