A National Public Health Agenda for OSTEOARTHRITIS 2010

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DEPARTMENT OF HEALTH & HUMAN SERVICES · USA

CDC
Centers for Disease Control and Prevention

Foreword from CDC & the Arthritis Foundation

A decade ago, the Centers for Disease Control and Prevention and the Arthritis Foundation launched *The National Arthritis Action Plan: A Public Health Strategy*, a landmark document that put arthritis on the public health map and laid out a plan for marshalling the nation's resources to confront the greatest single cause of chronic pain and disability among Americans.

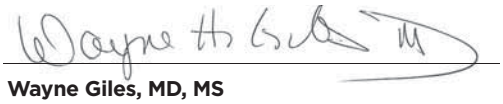
It is with great pride that 10 years later, our partnership still strong, we come together in collaboration with a large and diverse group of stakeholder organizations to announce the 2010 publication of *A National Public Health Agenda for Osteoarthritis*. This call to action focuses on the most common form of arthritis and points the way forward by building upon the lessons learned over the past decade of our collaborative effort to delay the onset or reduce the progression of all forms of arthritis.

At a time when the nation is on the cusp of initiating major health care reforms amidst greater recognition of the adverse contribution that chronic disease makes to escalating health care costs, we must take bold and concerted action to prevent and reduce the impact of all chronic illnesses. Osteoarthritis affects an estimated 27 million Americans, promises to become even more widespread as Baby Boomers age, and is widely prevalent. Successful efforts to address the problem of osteoarthritis promise to deliver benefits not only to people with this serious condition, but also to people who have the management of their other chronic diseases complicated by co-occurring osteoarthritis, and to our nation as a whole.

Since *The National Arthritis Action Plan* was introduced in 1999, we have learned a great deal about what can be done to reduce disability and improve the quality of life of people with osteoarthritis. We have also learned a great deal about how to deliver interventions that work.

The recommendations presented in *A National Public Health Agenda for Osteoarthritis* provide an opportunity for us to work together to alter the trajectory of this disease so the millions of Americans who struggle with this painful and important public health problem can live fuller and more independent lives.

We commend this report to you and applaud your interest in working to address this critical public health challenge.



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A National Public Health Agenda for Osteoarthritis

Executive Summary

Arthritis is the most common cause of disability, and osteoarthritis is our nation's most common form of arthritis. This serious, painful and potentially life-altering joint disease places severe limits on daily activity and quality of life for over 27 million Americans. Affecting mainly hands, knees and hips, osteoarthritis (OA) often causes weakness and disability, interferes with work productivity, results in joint replacement and generates inordinate socioeconomic costs. In view of the fact that the U.S. population is aging and obesity is on the rise, the prevalence, health impact and economic consequences of OA are expected to increase dramatically.

Now is the time for bold and innovative action to reduce the burden of this growing public health issue. *A National Public Health Agenda for Osteoarthritis* sets the stage for a collaborative and focused initiative to achieve three overall goals over the next three to five years:

- Ensure the availability of evidence-based intervention strategies — such as self management education, physical activity, injury prevention, and weight management and healthy nutrition — to all Americans with OA
- Establish supportive policies, communication initiatives and strategic alliances for OA prevention and management
- Initiate needed research to better understand the burden of OA, its risk factors and effective strategies for intervention.

Blueprint for Action: Recommended Intervention Strategies

Four intervention strategies to address OA are currently recommended for widespread public health dissemination. Some of these strategies focus on controlling the symptoms of OA — reducing pain, functional loss, and disability for people with symptomatic OA — while others have potential for preventing the disease. As a package, they hold great promise for improving the quality of life for those with OA and ultimately reducing the tremendous burden of this chronic disabling condition.

Recommendation 1:

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

- Improve access to self management education through community and clinical linkages to promote early initiation of lifestyle modifications to reduce pain.

- Develop alternative modes and venues of program delivery and encourage new kinds of partnerships.
- Assure adequate funding for development and widespread use of tools that support effective and efficient adoption, use and maintenance of self management education programs in the community.

Recommendation 2:

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/or knee.

- Increase access and continue to identify additional effective packaged programs for physical activity that can be delivered safely in a variety of accessible and acceptable formats and settings.
- Implement the 2008 US Department of Health and Human Services *Physical Activity Guidelines for Americans* fully and encourage expanded strategies to increase physical activity and reduce inactivity among people with OA.
- Build supportive environments by implementing built-environment, land use and design policies and other policy and environmental supports proven to increase physical activity, such as those found in the *Guide to Community Preventive Services* and other evidence-based sources.

Recommendation 3:

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

- Promote the widespread adoption of rules, policies and legislation that reduce, in all appropriate settings and venues, musculoskeletal injuries that may lead to OA.
- Adopt and implement proven injury prevention strategies such as those found in the *Guide to Community Preventive Services* and integrate injury prevention into policy agendas of other federal agencies.
- Promote widespread implementation of activity-specific rules and policies for worksites and for organized sports, recreation and school athletics to prevent joint injuries that can lead to OA.
- Incorporate balance training and other forms of dynamic exercise into physical activity programs to reduce fall-related injuries for older adults with OA.

Recommendation 4:

Weight management should be promoted for the prevention and treatment of OA, and national nutrition and dietary guidelines for the general population should be followed by adults with OA so they select a quality diet while staying within their calorie requirements.

- Endorse national obesity prevention policy by implementing the recommendations of the *Surgeon General's Call to Action to Prevent and Decrease Overweight and Obesity* and the *Recommended Community Strategies and Measurements to Prevent Obesity in the United States: Implementation and Measurement Guide* that impact the health of people with or at risk for OA.
- Promote nutritional guidelines by supporting widespread adoption of the *Dietary Guidelines for Americans* by all Americans with OA.

> "Public health in the future will be increasingly about improving the quality of life, not merely its length. Arthritis, with the pain and limitation it inflicts on millions of our people, young and old, sits right in the center of that future."
>
> James S. Marks, MD, MPH
> *Senior Vice President & Director*
> Robert Wood Johnson Foundation

- Support worksites that offer onsite nutrition and weight management classes or counseling and reimbursement for participation in offerings from external sources.
- Promote policies related to evaluation, monitoring and dissemination of reliable consumer information regarding the safe and efficacious use of dietary/nutritional supplements.

Forging Ahead: Recommended Policies and Communication Initiatives

Making the Blueprint for Action a reality requires a complement of strong national policy initiatives, communication strategies and sustained strategic alliances among multiple stakeholders and invested partners.

Recommendation 5:

A national policy platform for OA should be established to improve the nation's health through evidence-based clinical and community prevention and disease control activities, including core public health infrastructure improvement activities.

- Identify specific national policy goals and objectives that would serve to prevent the onset of OA or progression of disease, and that promote evidence-based public health interventions.
- Establish national priorities for OA prevention and control initiatives and research that reflect health disparities.

Recommendation 6:

Systems to deliver evidence-based interventions should be expanded.

- Establish state-based arthritis prevention programs in all 50 states, and work with national organizations to scale up capacity to deliver evidence-based programs nationwide in a multitude of community-based agencies and settings.
- Assess existing opportunities to integrate OA messages into current state and federal efforts addressing overlapping audiences and strive to make healthy behaviors the default choice for people with OA by engaging with policy and environmental change efforts in obesity, physical activity and nutrition.
- Advocate and provide public and private financing for participation in evidence-based, community and workplace physical activity and self management education programs for adults with OA.

Recommendation 7:

Quality and equity should be assured.

- Develop systems to assure the quality of the implementation of public health interventions directed toward reducing the impact of OA.
- Ensure that evidence-based interventions for OA are available to all who need them in a variety of community-based settings and that supportive policies and environments are available to all.

Recommendation 8:

Workplace environments should be improved by adopting policies and interventions that prevent onset and improve managment of OA.

- Increase use and uptake of existing efforts to evaluate and address individual workplace risk factors for the onset and progression of OA.
- Expand workplace wellness programs to include evidence-based self management education and physical activity programs for OA, and greater use of workplace accommodations, particularly as outlined by the *Job Accommodation Network* for arthritis.

Recommendation 9:

A well designed communication strategy should be initiated and sustained to enhance understanding and change attitudes and behavior among consumers, healthcare providers, policy makers, employers and the business community, and community organizations.

- **For consumers:** Increase awareness of OA, its severity and available interventions through partnership outreach, grassroots efforts, media relations and advertising; expand relevant existing health communication campaigns; and create new campaigns to reach all ethnic and racial populations.
- **For healthcare providers:** Provide education and training about effective evidence-based interventions and enable clinicians and clinical care systems to refer and support participation in these programs; support linkages between clinical services and public health programs and influence discussions of referral and financing systems to enhance participation; and use administrative databases to remind physicians to initiate evidence-based interventions when an OA diagnosis appears or progresses.
- **For policy makers:** Develop a message platform to reach policy makers with targeted policy recommendations and create a communications plan that encompasses targeted advertising, Congressional educational visits, media messages, grassroots efforts and partnership integration; and support federal, state, local and organizational policies that support OA goals, including reduced joint injury, reduced obesity, improved physical activity and weight management, and expanded access to self management education.
- **For employers and business community:** Develop strategies and tools to encourage employers and insurers to implement policies for referrals, reimbursements or health communication strategies for addressing OA, and incentives for implementing evidence-based programs in the worksite; and encourage these groups to support state and local programs and services geared at reducing the economic and social costs of OA.

- **For communities:** Develop and distribute marketing information to community organizations that may be unaware of or not utilizing effective intervention strategies; develop or tailor existing grassroots materials with a focus on how to implement and market effective interventions; and support community-level policy and system change efforts that improve nutrition, physical activity and injury prevention environments.

The Research Horizon: Priority Knowledge Gaps

Recommendation 10:

Research and evaluation should be pursued to enhance surveillance, better understand risk factors, refine recommended intervention strategies, evaluate workplace interventions, and examine emerging evidence on additional promising interventions.

- Enhance surveillance by funding the National Health and Nutrition Examination Survey (NHANES) to assess the prevalence and impact of OA at various joint sites to update estimates from previous surveys, and provide estimates of disparate impact, risk factors, adverse outcomes and natural history; and add questions about OA to large randomized clinical trials that are examining other chronic diseases such as heart disease or diabetes.
- Develop and perform research on a multiple risk factor intervention for the prevention of progressive OA-associated structural damage, symptoms, activity limitation, reduced quality of life, and participation restriction for persons with and at risk for knee OA.
- Explore early diagnosis and treatment by identifying valid and responsive markers of OA structural damage.
- Continue to refine the effectiveness of recommended interventions — self management, physical activity, injury prevention, and weight management — for the prevention and management of OA.
- Evaluate interventions to address work-related OA onset and progression.
- Examine emerging evidence related to biomechanics and mind/body interventions.

In the context of healthcare reform and our current fiscal climate, we cannot afford to delay implementation of known effective strategies for the prevention and management of OA. We can and must adopt a focus on risk factors and interventions common to OA and other chronic diseases. In addition, we must develop strong linkages between community and clinical care providers who offer the full range of treatments for OA, and assure that all Americans can access and afford the services they need. By embracing the specific recommendations in this *National Agenda*, we can alter the current trajectory of this disease and improve the quality of life for millions of Americans. We urge you to join us in this initiative as we strive for a nation in which those with OA are able to live full lives with less pain and stiffness, greater mobility, and preserved function and independence.

A National Public Health Agenda for Osteoarthritis

Ten Recommendations

1. Self management education should be expanded as a community-based intervention for people with symptomatic OA.
2. 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/or knee.
3. Existing policies and interventions that have been shown to reduce OA-related joint injuries should be promoted, implemented and enforced.
4. Weight management should be promoted for the prevention and treatment of OA, and national nutrition and dietary guidelines for the general population should be followed by adults with OA so they select a quality diet while staying within their calorie requirements.
5. A national policy platform for OA should be established to improve the nation's health through evidence-based clinical and community prevention and disease control activities, including core public health infrastructure improvement activities.
6. Systems to deliver evidence-based interventions should be expanded.
7. Quality of and equal access to evidence-based interventions for OA should be assured.
8. Workplace environments should be improved by adopting policies and interventions that prevent onset and progression of OA.
9. A well designed communication strategy should be initiated and sustained to enhance understanding and change attitudes and behavior among consumers, healthcare providers, policy makers, employers and the business community, and community organizations.
10. Research and evaluation should be pursued to enhance surveillance, better understand risk factors, refine recommended intervention strategies, evaluate workplace interventions, and examine emerging evidence on additional promising interventions.

I. A Compelling Need

Public Health Burden

Arthritis affects 46 million adults in the United States and is our nation's most common cause of disability.[1] The most common form of this highly prevalent disease is osteoarthritis (OA) — a serious, painful and potentially life-altering joint disease mainly affecting hands, knees and hips.

OA is caused by genetic, local mechanical stresses or systemic factors that lead to joint cartilage loss, bony overgrowth and other bone changes, and alterations in ligaments, menisci and muscles. Symptoms include joint pain, aching, stiffness and swelling. Muscle weakness and poor physical functioning are additional consequences of OA that, when combined with the primary symptoms of this disease, can be disabling and often require surgical joint replacement.

The burden of OA can be estimated using data on clinical OA (from physical history and exams), radiographic OA (using x-ray), or symptomatic OA (symptoms plus radiographic evidence). The latter, symptomatic OA, is most relevant for public health purposes since the symptoms — pain, aching, stiffness and swelling — are often what bother affected individuals first.

OA is highly prevalent and on the rise.
More than 27 million adults have OA, a number expected to increase with longer life expectancies, the obesity epidemic, and the first of the 78.2 million baby boomers[2] reaching retirement age in 2011. Half of all adults will develop symptomatic OA of the knee at some point in their lives[3] and that risk increases with obesity to two of every three obese adults.[4]

Osteoarthritis by the Numbers

- **27 million Americans** with OA
- **632,000 joint replacements** due to OA each year
- **11.1 million** outpatient visits for OA
- **$13.2 billion** spent on job-related OA

OA is not just an older person's disease.
OA prevalence starts rising sharply at age 45, affecting the large working age population. In addition, early onset OA can develop within ten years of a major joint injury or in cases of congenital abnormalities. Thus, a teenager injured at age 15 could have OA as early as age 25 or 30.[5]

OA affects some more than others.
OA prevalence is higher among women than men at all ages and at least as frequent among blacks as whites.[6] The Johnston County (North Carolina) Osteoarthritis Project has documented racial differences (between African Americans and Caucasians) in the prevalence of OA at specific joints.[7,8]

OA is more common in certain occupations. These occupations include mining, construction agriculture, and sectors of the service industry[9,10] which involve physically demanding or heavy labor tasks, lifting or carrying heavy loads, exposure to vibration, high risk of joint or tissue injury, and prolonged periods of working in awkward or unnatural postures such as kneeling, stooping or crawling.

OA places substantial limits on daily activity and quality of life. About 25% of people with knee OA have pain on ambulation and have difficulty doing major activities of daily living (ADLs) such as walking ¼ mile, climbing stairs, and kneeling or stooping. In addition, 15% have to use an assistive device such as a cane or crutch for walking.[11] Annually, nearly one million years are lived with disability from hip and knee OA, making it the third leading cause of years lived with a disability (YLD) in the U.S.[12]

OA impairs work productivity. For working adults ages 18–64 years, OA can interfere with the ability to work productively.[13] As more adults continue to work beyond age 65,[14] OA is likely to further impede the quality of their work and their ability to engage in long-awaited retirement activities without pain and disability.

OA complicates other prevalent diseases. More than half of all adults with diabetes or heart disease also have arthritis, most of which is likely to be OA. Physical activity is a crucial element for managing these chronic conditions, but OA pain often inhibits participation.[15]

OA treatment is not provided equitably. Total knee replacement (TKR) is an effective method of reducing pain and improving physical function among those with disabling knee OA. Despite similar risks among blacks and whites for symptomatic knee OA, the TKR rate for blacks was 37% lower than the rate for whites in 2000 (3.6 versus 5.7 per 1,000 population) and 39% lower in 2006 (5.6 versus 9.2 per 1,000 population).[16]

Socioeconomic Impact

As a nation, we pay an inordinate price for the pain and disability from OA. In 2004, OA resulted in over 11 million physician and outpatient visits, 662,000 hospitalizations, and more than 632,000 total joint replacements, with accompanying hospital costs of $22.6 billion.[17] In addition, employment rates are lower among adults with arthritis;[18] approximately 30% of adults aged 18–64 with doctor-diagnosed arthritis report an arthritis-attributable work limitation,[19] which means they are working less or not working at all due to their arthritis. While these data consider all types of arthritis, it is likely that OA accounts for a large portion of those with work limitations. An estimated $3.4–13.2 billion is spent per year on job-related OA costs.[20]

Sense of Urgency

These data foreshadow a public health storm that will send ripples throughout all sectors of society. Despite its widespread prevalence and socioeconomic impact, however, OA remains a relatively unaddressed public health and economic issue compared to other chronic disease areas such as cancer, diabetes, and heart

disease. Although OA can affect everything from holding a job to holding a hair brush, the condition is met with complacency and the misconception that aches and pains are an inevitable part of aging. Many see OA as a disease to be tolerated, certainly not one to be managed. This complacency, coupled with "message overload" about other health challenges and conflicting prevention messages, make it difficult to drive home the pressing burden of this disease and to take advantage now of the interventions we know can help.

Several modifiable risk factors contribute to the onset of OA and its progression. Excess body mass due to obesity and overweight are clearly implicated in the development of OA of the knee and probably OA of the hip as well. Certain types of joint injuries, particularly those to the knee, also increase the risk of OA.[21,22] Once OA is present, physical inactivity and increasingly sedentary lifestyles may play a major role in aggravating the associated pain, function and disability of OA.[23] Malalignment of the knee is also an important risk factor for progression of OA.[24]

Because OA shares risk factors with other chronic conditions, such as diabetes and heart disease, the self management and lifestyle changes to prevent or manage OA will likely improve the outcomes for these conditions as well.[25,26] This connection presents a unique opportunity to integrate the public health response to OA with the growing tide of effort directed toward all chronic diseases. Effective public health strategies are available to help reduce the current and future impact of OA; however, most of them reach less than one percent of Americans in need.[27]

According to a recent survey, 52% of Americans would rather die than live with a serious disability.[28] We can no longer accept the pain of OA as an inevitable part of aging; instead, we must have the courage to tackle OA head on within the broader chronic disease prevention arena. Together as a nation, we can and must take proactive steps to limit the impact that this condition will have on our lives and society.


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II. The Strategic Response

Development of Agenda

In early 2008, leadership from the Centers for Disease Control and Prevention (CDC) and the Arthritis Foundation (AF) initiated a collaboration to explore ways of reducing the public health burden of OA over the next three to five years. A small Steering Committee comprising representatives from CDC, AF and the National Institutes of Health (NIH) provided policy guidance and oversight through a year-long planning process. Also joining the Steering Committee were the Co-chairs of two Working Groups, one focused on interventions and the other on policies and communication strategies.

Working Group members were chosen carefully to reflect relevant background, expertise and experience and collectively represent such disciplines as: rheumatology, orthopedics, epidemiology, psychology, nursing, physical therapy, exercise physiology, nutrition, biomechanical engineering, occupational health, healthy aging, behavior change, occupational therapy, public health, public health policy, communication and social marketing. In addition to evaluating the literature, the Working Group considered the implications of a separate expert panel on risk factors for knee OA convened in October 2008 by the National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS).

The White Papers produced by the Working Groups were vetted at an OA Summit in April 2009, with over 75 participants from a wide variety of national, state and community-based organizations invested in OA prevention and management, included by selection of the Steering Committee. *A National Public Health Agenda for Osteoarthritis* reflects the outcome of the Summit participants' deliberations. There was widespread consensus on the recommendations contained in this document.

Vision and Goals

This National Agenda sets the stage for a collaborative and focused initiative aligned with the anticipated Healthy People 2020 Objectives for the Nation.[29] Three goals guide the initiative:

1. To ensure the availability of evidence-based intervention strategies — such as self management education, physical activity, injury prevention, and weight management and healthy nutrition — to all Americans with or at risk for OA;
2. To establish supportive policies, communication initiatives and strategic alliances for OA prevention and management; and
3. To initiate needed research to better understand the burden of OA, its risk factors and effective strategies for prevention and intervention.

Although these goals encompass OA of all joints, the primary emphasis for improving function is on the hip and knee. In some areas, the science base for public health burden and action is strongest for OA of the lower extremities.

Primary audiences for the National Agenda include both the public and private sector: federal, state and local governments and policy makers, business and industry, non-profit organizations, foundations and associations, insurers and healthcare providers, and patient advocacy and community organizations. These sectors play a catalytic role in moving the National Agenda forward and bringing us closer to our ultimate vision: a nation in which those with OA are able to live full lives with less pain, stiffness and disability; greater mobility; and preserved function and independence.

Guiding Principles

The fundamental tenets of public health, with its broad perspective on achieving lasting change in the health of communities, serve as guideposts for this National Agenda:

- ✓ Affirmation of public health efforts aimed at reducing pain and disability and improving function and quality of life
- ✓ Adoption of a strategic focus on effective interventions common to OA and other chronic diseases
- ✓ Commitment to a firm grounding in science and evidence-based interventions
- ✓ A population-based approach that targets specific groups when appropriate — be they all people at risk of OA, just those with OA, only those at risk of disability from OA, or those with a particular joint affected by OA
- ✓ The vital contribution of social determinants of health in providing context, targeting risk groups and influencing quality of life
- ✓ Importance of reducing racial and ethnic disparities in the burden of OA
- ✓ Recognition of the multiple strategic alliances essential for advancing the public's health.

Along with the partnering organizations participating in this initiative, we invite you to join us in our quest to increase awareness of OA's burden and impact; promote recommended interventions, policies, communication strategies and research; and ultimately improve the lives of the millions of Americans with OA.

"Osteoarthritis is a major public health issue resulting in pain and disability for many Americans. *A National Public Health Agenda for Osteoarthritis* is the first plan that effectively defines public health targets to decrease the growing OA-related disability in the US. Implementation of its recommendations has the potential to significantly improve the lives of millions of Americans."

Roland W.Moskowitz, M.D.
US Representative
Osteoarthritis Research Society International

Clinical Professor of Medicine
University Hospitals Case Medical Center
Cleveland, Ohio, USA

Proposed Healthy People 2020 Objectives

Arthritis, Osteoporosis, and Chronic Back Conditions (AOCBC)

AOCBC HP2020-1 Reduce the mean level of joint pain among adults with doctor-diagnosed arthritis.

AOCBC HP2020-2 Reduce the proportion of adults with doctor-diagnosed arthritis who experience a limitation in activity due to arthritis or joint symptoms.

AOCBC HP2020-3 Reduce the proportion of adults with doctor-diagnosed arthritis who have difficulty in performing two or more personal care activities, thereby preserving independence.

AOCBC HP2020-4 Increase the proportion of adults with doctor-diagnosed arthritis who receive health care provider counseling.

a) For weight reduction among overweight and obese persons
b) For physical activity or exercise

AOCBC HP2020-5 Reduce the impact of doctor-diagnosed arthritis on employment in the working-aged population.

a) Reduction in the unemployment rate among adults with doctor-diagnosed arthritis
b) Reduction in the proportion of adults with doctor-diagnosed arthritis who are limited in their ability to work for pay due to arthritis

AOCBC HP2020-6 Increase the proportion of adults with chronic joint symptoms who have seen a healthcare provider for their symptoms.

AOCBC HP2020-7 Increase the proportion of adults with doctor-diagnosed arthritis who have had effective, evidence-based arthritis education as an integral part of the management of their condition.

* Proposed HP2020 Objectives for public comment as of Fall, 2009.
For a full list of Objectives see: http://www.healthypeople.gov/hp2020/Objectives/TopicAreas.aspx

III. Blueprint for Action

Introduction

Four intervention strategies for addressing OA are ready for widespread public health dissemination:

- **Self management education**
- **Physical activity**
- **Injury prevention**
- **Weight management and healthy nutrition**

The first two, self management education and physical activity, focus primarily on reducing the symptoms and progression of OA for those who have the disease; the remaining two, injury prevention and weight management, offer opportunities to prevent OA from occurring. Collectively, they hold great promise for improving the quality of life for those with OA and reducing the tremendous burden from this chronic disabling condition. Each of them is described more fully on the following pages, along with recommendations for expanding their availability and use as public health interventions.

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

Self Management Education

Self management education (SME) is a process to help adults with a chronic condition learn how to manage their condition, prevent its short- and long-term health consequences, and achieve the best possible quality of life. It has been used successfully with a variety of chronic diseases, most notably diabetes and asthma, and can be provided in a variety of settings including community gathering places, the home, recreational camps, worksites and schools. There is sufficient evidence to support SME as an effective public health intervention for OA as well. While the individual effects of SME on pain and disability are small, these effects translate into significant improvements when delivered on a population basis.[31,32,33] Further, for relatively little financial investment, SME can yield remarkable mental health and psychological benefits — reductions in anxiety, depression and health distress. These benefits, along with the absence of side effects, make SME a valuable public health intervention and a useful adjunct to care delivered in a clinical setting.[33,34,35,36]

SME Programs with Demonstrated Benefits for People with Arthritis

- Arthritis Self Management Program/Arthritis Foundation Self Help Program
- The Arthritis Toolkit
- Spanish Arthritis Self Management Program *(Programa de Manejo Personal de la Arthritis)*
- Chronic Disease Self Management Program
- Spanish Chronic Disease Self Management Program *(Tomando Control de su Salud)*

Recommended Interventions for OA

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

Improve Access through Community and Clinical Linkages

The benefits of SME should be available to all in need regardless of geographic location, ability to pay, literacy and race or ethnicity. Strong partnerships between the public health system, community-based organizations and the clinical care system are vital.

- ✓ We must promote the early initiation of lifestyle modifications to reduce pain using proven self management education programs.
- ✓ We must advocate and provide public and private financing for participation in evidence-based self management education programs for adults with OA.

- ✓ We must encourage creativity in the development of alternative modes and venues of program delivery, from high-tech internet options to low-tech phone contact.
- ✓ We must encourage new kinds of partnerships to support program delivery and foster relationships with clinical care providers to facilitate engagement in these programs by people with OA.

Provide Tools

Optimal implementation will require tools to support efficient and effective program operation. These include, but are not limited to, tools to guide an organization's decision to adopt a specific intervention program, foster quality improvement, calculate cost of program delivery, recruit participants and support program implementers.

- ✓ We must assure adequate funding for development and widespread use of tools that support effective and efficient adoption, use and maintenance of SME programs in the community.

Key Research Priorities

- Identify effective strategies to disseminate self management education programs to diverse OA populations. This will require exploration of barriers, benefits and acceptability of self management education interventions in culturally diverse groups.
- Identify characteristics of people with OA most likely to benefit from self management education (utilizing health status, symptom levels and demographic information) to guide appropriate targeting of interventions, and identify essential elements of effective self management education interventions for people with OA (i.e., the importance of modeling, problem solving, goal setting, motivational interviewing or other program features) to facilitate efficient and, where appropriate, tailored intervention delivery.
- Understand the interface between self management education programs and clinical care for persons with OA (e.g., the extent to which effectiveness of self management education interventions are influenced by the degree of self management support by healthcare professionals provided in the clinical setting).
- Determine the costs and cost effectiveness of program delivery by comparing different forms of self management education interventions in OA populations.

Physical Activity

Research has shown that physical activity decreases pain, improves function and reduces disability associated with all forms of arthritis.[37] Additionally, regular physical activity can help people achieve or maintain a healthy weight, which is particularly important given that overweight and obesity are also known risk factors for OA.[38]

> 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.

The safest and most effective physical activities for adults with OA of the hip and/or knee are low impact, moderate intensity aerobics — such as walking, water exercise and cycling — and muscle strengthening exercises that use different forms of resistance. Investments of as little as 60 minutes per week can yield some improvements for people with OA,[26] but a minimum of 150 minutes (2.5 hours) of moderate intensity aerobic and two days of muscle strengthening exercise per week is recommended to improve OA pain and function and to support prevention and management of other chronic conditions.[39]

In general, adults with OA should avoid physical inactivity and be encouraged to participate in any activity that their abilities and conditions allow. These activities can be delivered in a variety of formats — in individual homes and group settings or individualized with trained exercise instructors, to name a few. While no single type of activity or delivery format has been determined to be more effective than another, programs with 12 or more supervised contact sessions, regardless of delivery format, are likely to yield the greatest benefit.[40] Adults should view these activities to be in addition to their usual daily activities such as shopping, walking to work and housecleaning.

Recommended Interventions for OA

Programs with Demonstrated Benefits for People with Arthritis[41]

- Active Living Every Day
- Arthritis Foundation Aquatics Program
- Arthritis Foundation Exercise Program
- Arthritis Foundation Walk with Ease
- EnhanceFitness®
- Fit & Strong!

Recommended Physical Activity for Adults

- 2 hours and 30 minutes a week of moderate-intensity, or 1 hour and 15 minutes (75 minutes) a week of vigorous-intensity aerobic physical activity, or an equivalent combination of moderate- and vigorous-intensity aerobic physical activity. Aerobic activity should be performed in episodes of at least 10 minutes, preferably spread throughout the week.
- Additional health benefits are provided by increasing to 5 hours (300 minutes) a week of moderate-intensity aerobic physical activity, or 2 hours and 30 minutes a week of vigorous-intensity physical activity, or an equivalent combination of both.
- Muscle-strengthening activities that involve all major muscle groups performed on 2 or more days per week.

Special Considerations for People with Chronic Conditions (including Osteoarthritis)

- Any activity is better than none. Adults with chronic conditions obtain important health benefits from regular physical activity.
- When adults with chronic conditions do activity according to their abilities, physical activity is safe.
- Adults with chronic conditions should be under the care of healthcare providers. People with chronic conditions and symptoms should consult their healthcare providers about the types and amounts of activity appropriate for them.

Source: Physical Activity Guidelines for Americans, available at: http://www.health.gov/PAGuidelines/guidelines

For specific research findings on physical activity for people with osteoarthritis, see: The Physical Activity Guidelines Advisory Committee Scientific Report available at: http://www.health.gov/PAGuidelines/Report/pdf/CommitteeReport.pdf

Most adults with mild to moderate OA can initiate and monitor their physical activity safely, without professional advice. However, persons with special issues, such as severe lower extremity malalignment or multiple co-existing chronic conditions, should consult with a healthcare professional to select activities that are low impact and appropriate to their ability.[42] Professional advice should also be sought if any OA symptoms are exacerbated by physical activity, and care should always be taken to avoid injury.

Design Packaged Programs

Not everyone with OA will have access to a group exercise program or be inclined to join one. Overcoming these obstacles requires expanding the format options for delivery of group programs.

✓ We must continue to identify additional effective packaged programs that can be delivered safely in a variety of accessible and acceptable formats such as group classes, home-based instruction and self-directed guides; and in different settings such as the community, worksites and healthcare system.

Implement Physical Activity Guidelines

The *Physical Activity Guidelines for Americans*[43] issued by the U.S. Department of Health and Human Services promote minimum levels of activity for all people, including the elderly and individuals who have musculoskeletal disorders such as OA. They also emphasize that certain forms of physical activity are actually beneficial in terms of managing symptoms such as pain faced by people with OA.

✓ We must implement the 2008 U.S. Department of Health and Human Services *Physical Activity Guidelines for Americans* fully and encourage the development and implementation of strategies to increase physical activity and reduce inactivity among people with OA.

Build Supportive Environments

The *Guide to Community Preventive Services* demonstrates that street- and community-scale urban design land use policies and practices can be used effectively to increase physical activity for a variety of populations.[44] These include building codes, road design standards and government policies that create safer and more inviting environments, reduce potential for injury, assure continuity and connectivity of sidewalks, and address proximity of residential housing to stores, jobs, schools and recreation. The Guide also recommends increased access to places for physical activity combined with informational outreach.

In a major new chronic disease initiative (www.cdc.gov/nccdphp/recovery), CDC identified five areas of action for policy and environmental change related to obesity, physical activity and nutrition referred to as MAPPS Interventions. MAPPS stands for Media, Access, Price, Point

"Exercise has become very important to me. I want to keep mobile, and the old adage "*Use it or lose it*" is very true. The stiffness we feel in the morning—exercise helps it go away. I wish the millions of others with osteoarthritis would know that exercising will decrease their pain and get them moving."

Estelle Fay Lovejoy, from *Rhode Island*
5- year Arthritis Foundation Exercise Program participant

of decision prompts, and Social support. Action in these five areas using evidence-based policy change can make healthy choices default choices, and should include actions that reach populations with OA. (For more information on MAPPS, see www.cdc.gov/nccdphp/recovery.)

- ✓ We must accept and implement built-environment, land use and design policies, and other policy and environmental supports proven to increase physical activity, such as those found in the *Guide to Community Preventive Services* and other evidence-based sources, since these population-based approaches also impact people with OA.
- ✓ We must pursue and fully embrace the strategies outlined in the *Guide to Community Preventive Services* and the *Physical Activity Guidelines for Americans* and other evidence-based sources that promote physical activity in the workplace.

Overcome Barriers to Activity and Participation

It is no secret that physical activity can be daunting to people with OA, particularly those who have limited mobility. The episodic pain they experience may understandably inhibit their willingness to exert themselves, for fear of exacerbating their discomfort or worsening their condition. Though effective physical activity interventions for OA exist, they are currently underutilized.

- ✓ We must continue to examine the role of physical activity as an OA management strategy, with attention to meeting the *Physical Activity Guidelines for Americans* and *Healthy People* recommendations for reducing the prevalence of physical inactivity among adults with arthritis.

Key Research Priorities

- Develop and test community-based behavior change and policy interventions aimed at improving physical activity behavior of large populations of persons with or at risk for knee and hip OA.
- Identify key characteristics or essential elements of effective aerobic and muscle strengthening interventions for people with OA, particularly to define the optimal dose of activity that produces clinically relevant and patient-oriented OA outcomes including meaningful improvement in quality of life.
- Understand the interface between physical activity programs and clinical care for persons with OA (e.g., the extent to which healthcare provider counseling for physical activity influences an OA patient's behavior, healthcare provider referrals, etc.).
- Conduct cost-effectiveness studies comparing different formats and delivery options of physical activity interventions in OA populations.

Injury Prevention

Traumatic injury is a recognized risk factor for the later development of OA and accounts for approximately 12% of total OA prevalence.[47] An estimated 5.6 million U.S. adults have posttraumatic OA of the knee, hip or ankle, costing the nation $3.1 billion annually for healthcare costs alone.[48] Lifetime risk of knee OA is 57% among persons with a history of prior knee injury,[49] and specific injuries, such as anterior cruciate ligament (ACL) ruptures and ankle fractures, have been clearly linked to incident OA.[50–57] Still unclear is the role of other injuries, such as minor joint sprains, muscle/tendon strains and chronic (e.g., tendonitis) conditions, in the development of OA.

Given the strong relationship between injury and subsequent OA, interventions and policies that reduce OA-related joint injuries are clearly a potential tool in the quest to reduce the burden of OA. Unfortunately, prevention is extremely complex because injuries happen during a variety of activities (sports and recreation, home and leisure, motor vehicle crashes, occupational, etc.), have different mechanisms (contact/noncontact sports, falls, etc.), and require interventions targeted to different entities (individual, communities, industry, etc.). Even within the sports and recreation domain, the same sport can be played with different rules and equipment at different levels of intensity, be governed by different organizations, and have different injury patterns. In addition, interventions deemed effective may be difficult to disseminate in traditional public health settings due to lack of standardization of intervention components and underdeveloped infrastructure. Despite these challenges, every attempt should be made to promote available evidence-based interventions for preventing injuries that may lead to OA in all appropriate settings and venues.

Recommended Interventions for OA

Injury prevention is also important for older adults who already have OA since they may be at increased risk for falling and sustaining injuries due to muscular weakness, impaired balance and gait dysfunction.[58] Balance training and other forms of dynamic exercise have been shown to reduce the frequency and rate of falling[59] among older adults and are important components of a comprehensive physical activity program for older adults.[60]

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

Promote Existing Policy

- ✓ We must promote the widespread adoption of rules, policies and legislation that reduce, in all appropriate settings and venues, musculoskeletal injuries that may lead to OA.
- ✓ We must adopt and implement proven injury prevention strategies such as those found in the *Guide to Community Preventive Services*.[61]
- ✓ We must integrate injury prevention into policy agendas of other federal agencies (e.g., Department of Defense Joint Forces, National Highway Traffic Safety Administration, Occupational Safety and Health Administration).
- ✓ We must promote widespread implementation of activity-specific rules and policies for organized sports, recreation, and school athletics to prevent joint injuries that can lead to OA (*see box for two examples*).
- ✓ We must incorporate balance training, Tai Chi and other forms of dynamic exercise into physical activity programs for older adults with OA.

"Injury is a major risk factor for osteoarthritis and in sports related injury, the use of breakaway bases in baseball and softball for prevention of ankle injuries has good evidence for effectiveness. The AAOS supports *A National Public Health Agenda for OA* that recommends the expansion of injury research to describe the epidemiology of, and evaluate the potential prevention interventions of OA-related injuries. "

E. Anthony Rankin, MD
Clinical Professor of Orthopaedic Surgery
Howard University
Past President
American Academy of Orthopaedic Surgeons

Key Research Priorities

- Describe the epidemiology of injuries that may lead to OA, specifically:
  - ✓ Further define what types and severity of injuries are related to the development of OA
  - ✓ Identify how (mechanism) and where (place of occurrence) OA-related injuries occur
  - ✓ Investigate and identify modifiable risk factors for OA-related injuries.
- Promote the development and evaluation of injury prevention strategies for OA-related injuries that occur in a variety of settings (worksite, sports and recreation, home and leisure, motor vehicle/transportation, etc.).

Two Examples of Injury Prevention in Sports

Neuromuscular conditioning programs have demonstrated effectiveness in reducing the risk of ACL injury in select settings.[62,63] To expand these programs at the community level, a number of hurdles must be overcome:

- No standardized program has been identified as "best practice."
- Instructor training and dissemination infrastructures are highly variable.
- One evaluated program is proprietary and has substantial training and licensing fees, while another is free but has no system to monitor fidelity of implementation.
- National sport governing bodies and health and safety organizations have yet to endorse these programs.
- Expected benefits depend upon an individual athlete's compliance to the prescribed program, which for some programs is low.

Nevertheless, given the impact of the injury and the effectiveness of these programs, their dissemination and implementation should be advocated. The importance of safe participation in physical activity for health promotion has been proactively addressed by the U.S. Department of Health and Human Services in the *2008 Physical Activity Guidelines for Americans*.[64] Endorsement of neuromuscular conditioning programs for the prevention of ACL injury by health and safety organizations and sports governing bodies would help communities and schools recognize the need for broad implementation of these programs. In addition, a coordinated effort across multiple organizations, government and individuals is essential for progress in this area to be realized.

Breakaway bases that release upon impact have been shown to prevent ankle injuries when used during baseball and softball games. This intervention has been evaluated across various levels of play (recreational, scholastic, intercollegiate and professional), among different age groups, and among both males and females.[65] Installation of breakaway bases may be slightly more expensive than stationary bases but are still highly cost beneficial when compared to the price of ankle injuries. In addition, use of these bases during game situations does not cause excessive delays in the length of games or complicate judgment calls by umpires.

Despite the availability of scientific evidence demonstrating the effectiveness of breakaway bases for almost 20 years, widespread adoption has been slow. In 2006, Little League Baseball instituted a policy requiring the use of breakaway bases on all fields to be effective January 1, 2008,[66] but no other baseball or softball governing body has implemented similar mandatory policies. In addition, a Position Statement from the American Academy of Orthopedic Surgeons recommends use of breakaway bases at all levels of baseball and softball. Implementation and enforcement of these and other similar policies could significantly expand reach of this effective intervention.

Weight Management and Healthy Nutrition

Scientific evidence on the health hazards of obesity continues to mount. Higher body mass index (BMI) is not only a major risk factor for diabetes, cardiovascular disease, cancer and premature death but is also implicated as a cause of OA, particularly of the knee.[68,69] People who maintain a healthy weight are less likely to develop symptomatic knee OA as they age and therefore less likely to need major surgical procedures to treat OA symptoms.[70–73] Being overweight can increase pressure on weight bearing joints and thereby increase pain and inflammation associated with OA. When present in knee and hip joints, OA has a greater clinical impact than when it affects other joints.[74]

The problems of overweight and obesity increasingly begin at a very young age. The prevalence of obesity among children aged 6 to 11 has more than doubled in the past 20 years, and the rate among adolescents aged 12 to 19 has more than tripled.[75,76,77,78] Obese youth are at increased risk for bone and joint problems[79,80,81] and are more likely than their peers with normal weights to become overweight or obese adults. As they age, they are at far greater risk of experiencing associated adult health problems, including OA.[82,83]

Although the role of excess weight as a contributor to the progression of OA remains unclear, modest weight loss among people with knee OA has been shown to produce meaningful improvements in physical function, self-reported disability, pain symptoms and quality of life. Overweight and obese adults with knee OA who lose just one pound gain a four-fold reduction in knee joint load.[84] These findings underscore the potential public health

Recommended Interventions for OA

importance of implementing appropriate weight management approaches for the prevention and treatment of knee OA, while at the same time suggesting the wisdom of weight management for people with OA in other joints.

Nutritional factors may also play a role in development, progression and management of OA but solid evidence of their impact remains elusive. While research efforts continue, people with OA can benefit from the current dietary recommendations[85] for all Americans to promote health and prevent chronic conditions. Note that in 2010, new *Dietary Guidelines for Americans* will be released.

Endorse National Obesity Policy

A variety of policies and initiatives exist to prevent or reduce overweight and obesity among all age groups, including the landmark document the *Surgeon General's Call to Action to Prevent and Decrease Overweight and Obesity* along with the recently released *Recommended Community Strategies and Measurements to Prevent Obesity in the United States: Implementation and Measurement*

Guide.[86] Full implementation is essential, with attention to people with OA as part of a comprehensive approach to prevent serious health consequences of obesity.

In addition, increased awareness and education about the role of overweight and obesity in causing or exacerbating OA should be on the agenda of policy and decision makers who influence school and worksite wellness and community or environmental planning.

- ✓ We must implement the recommendations of the *Surgeon General's Call to Action to Prevent and Decrease Overweight and Obesity* and the *Recommended Community Strategies and Measurements to Prevent Obesity in the United States: Implementation and Measurement Guide* that impact the health of people with or at risk for OA.
- ✓ We must promote policies, initiatives and state and national partnerships to help all people achieve and maintain a healthy weight, thereby potentially reducing the risk for developing OA and possibly reducing the burden of OA for those who do develop it.

Promote Dietary Guidelines

The *Dietary Guidelines for Americans* are the standard from which public policy and guidance related to nutrition, diet and health are developed. These guidelines are based on a comprehensive review of diet and health and provide science-based advice to promote health, reduce the risk of chronic conditions and improve health in individuals who have already developed risk factors or conditions. Furthermore, policies requiring access to healthy food choices and information about nutrient content of foods support health goals for people with OA.

As previously mentioned (in the Physical Activity section), CDC recently initiated MAPPS Interventions, a major new chronic disease initiative for evidence-based policy and environmental change related to obesity, physical activity and nutrition. These efforts should include actions that reach populations with OA so that they adopt healthy choices as lifelong behaviors. (For more information on MAPPS, see www.cdc.gov/nccdphp/recovery.)

- ✓ We must support widespread adoption of the *Dietary Guidelines for Americans* by all Americans with OA and support continued attention to consideration of the relationship of nutrition and dietary components and OA in future editions of the Guidelines.
- ✓ We must promote policies, initiatives and state and national partnerships to help all people achieve and maintain a healthy diet, thereby potentially reducing their risk for obesity and related OA risks.

Support Worksite Interventions

The *Guide to Community Preventive Health Services* recommends worksite interventions combining nutrition and physical activity to control obesity and overweight. These guidelines should be fully implemented.

- ✓ We must support worksites that offer onsite physical activity, nutrition and weight management classes or counseling as well as reimbursement and incentives for participation in offerings from external sources with information, technical support, and recognition.

Enhance Environment Support for Healthy Weight

Environmental modifications are needed to improve nutrition, increase opportunities for physical activity and participation, and support zoning and community planning policies that link energy intake and energy expenditure to the built environment.

- ✓ We must accept and implement built-environment, land use and design policies, and other policy and environmental changes proven to increase physical activity and access to healthy foods, such as those found in the *Guide to Community Preventive Services*,[89] and other evidence-based sources, since these population-based approaches also impact people with OA.

Address Nutritional Supplements

Nutritional supplements are often used by people with OA but current scientific evidence does not support recommending specific nutritional supplements to effectively prevent or manage OA. When considering recommendations related to dietary supplements, current lack of reliable consumer information and the resulting safety risks need to be clarified. Supplements currently available and those that will be developed should be evaluated for their effects on relevant OA outcomes so that the best recommendations regarding effectiveness, safety, acceptability and cost can be determined.

- ✓ We must promote policies related to evaluation, monitoring and dissemination of reliable consumer information regarding the safe and efficacious use of dietary/nutritional supplements.
- ✓ We must promote wide availability of easily understood information about the benefits, risks and limitations of nutritional supplements given the current lack of consistent consumer information about these products.
- ✓ We must provide information to consumers and providers about the safety and efficacy of the range of therapeutic agents with comparative information across supplements, over-the-counter and prescription medications.

Key Research Priorities

- Further identify the optimal amount of weight loss needed to produce improvements in clinically-relevant and patient-oriented OA outcomes in overweight or obese individuals with OA.
- Increase our understanding of the extent to which attenuating weight gain through appropriate weight management strategies may aid in the prevention of OA.
- Develop a more comprehensive understanding of the efficacy of behavioral strategies that will promote successful long-term weight management in persons with or at risk for OA.
- Clarify the role of specific dietary components and nutritional supplements in the prevention and management of OA.

IV. Forging Ahead

Translating the Blueprint for Action into reality can only be accomplished with a complement of policy initiatives, communication strategies and strategic alliances.

Priority Policy Initiatives

Establish a National Policy Platform

In the context of the national dialogue on healthcare reform, as well as widespread policy efforts directed at reducing obesity and improving physical activity and nutrition, we must encourage the creation of a national policy platform designed to improve the nation's health through evidence-based clinical and community prevention and disease control activities, including core public health infrastructure improvement activities, that are inclusive of OA. This national platform should:

- ✓ Identify specific national policy goals and objectives that would serve to prevent the onset of OA or progression of disease, and that promote evidence-based interventions that incorporate appropriate public health measures and standards
- ✓ Establish national priorities for OA prevention and control initiatives, taking into account unmet and emerging clinical and community health needs
- ✓ Establish national priorities for research on OA prevention and control strategies
- ✓ Identify health disparities in OA prevention, intervention and treatment initiatives
- ✓ Delineate specific strategies and activities for addressing and implementing the priorities above.

Expand Delivery of Interventions

Our public health structure lacks a systematic approach to disseminate evidence-based OA interventions. People with OA are often unaware of effective interventions, the interventions may not be available in their communities, or their clinical care providers may not consistently promote them.

In addition, public health practitioners, healthcare providers and others potentially in a position to serve people with OA frequently do not have the access, skills or capacity to implement known evidence-based interventions. Too often, effective interventions are underused despite their potential. Public health, clinical care and community agencies must work together to develop and engage systems that support people in need and guarantee their ability to access these interventions.

In the area of policy and environmental change, interventions that promote health in adults are likely to support better OA outcomes. However, OA has been largely absent from policy development and action in the intervention areas recommended in this National Agenda.

- ✓ We must deliver effective evidence-based interventions through expansion of state-based arthritis prevention programs in all 50 states, and work with national organizations to scale up capacity to deliver evidence-based programs nationwide in a multitude of community-based agencies and settings.

- ✓ We must assess existing opportunities to integrate OA messages into current state and federal activities and efforts addressing overlapping audiences.
- ✓ We must promote the early initiation of lifestyle modifications to reduce pain using proven effective physical activity approaches and self management education programs.
- ✓ We must support efforts to make healthy behaviors the default choice for people with OA by engaging with policy and environmental change efforts in obesity, physical activity and nutrition.
- ✓ We must advocate and provide public and private financing for participation in evidence-based, community and workplace physical activity and self management education programs for adults with OA.

Evaluate Quality and Outcome

Quality metrics and program evaluation are integral to assessing successful implementation of intervention programs. Results of such analyses can also be used to support the development of best practices for prevention.

- ✓ We must develop systems to assure the quality of the implementation of public health interventions directed toward reducing the impact of OA.

Assure Equity

While OA affects large numbers of people in every racial, ethnic and socioeconomic category, health disparities do exist. The disease may differentially affect populations, and access to care and public health interventions can vary widely. Populations face differing risk factors as well.

- ✓ We must ensure that all evidence-based interventions for OA are available to all who need them in a variety of community-based settings and that supportive policies and environments are available to all.

Improve Workplace Environment

In recent years, examinations of associations between work characteristics and OA have expanded beyond mechanical exposures to consider the roles that organizational policies and the psychosocial work environment may play in the development and severity of OA. Workplace policies and interventions for OA can be categorized into two groups: those that attempt to limit or alter mechanical exposures associated with OA; and those that are designed to create a psychosocially and ergonomically supportive work environment.

- ✓ We must increase use and uptake of existing efforts to evaluate and address individual workplace risk factors for the onset and progression of OA.
- ✓ We must expand workplace wellness programs that promote a culture of good health and management-level commitment to worker health and safety.
- ✓ We must expand workplace wellness programs to include evidence-based self management education and physical activity programs for OA, and greater use of workplace accommodations, particularly as outlined by the *Job Accommodation Network* for arthritis.[91]

Resources for OA in the Workplace

- Elements of Ergonomics Programs: A Primer Based on Workplace Evaluations of Musculoskeletal Disorders
- Ideas to Reduce Work-Related Musculoskeletal Disorders

Communication Strategy

Reaching our goal — reduced pain, burden and disability of OA — requires enhanced understanding and changes in attitudes and behavior among consumers, healthcare providers, policy makers, employers and the business community, and community organizations. Given the breath of this effort, customized strategies must be developed to reach each audience and a fully developed communication plan created. Priorities to inform this process follow.

For consumers, we must:

- ✓ Increase awareness of OA, its severity and available interventions through partnership outreach, grassroots efforts, media relations and advertising.
- ✓ Expand existing health communication campaigns such as the *Physical Activity*. *The Arthritis Pain Reliever* for Caucasians and African Americans and *Buenos Dias Artritis* for Spanish speaking individuals, and create new campaigns for other ethnic/racial populations.

For healthcare providers, we must:

- ✓ Provide education about effective evidence-based interventions and enable clinicians and clinical care systems to refer and support participation in these programs.
- ✓ Support linkages between clinical services and public health programs and influence discussions of referral and financing systems to enhance participation.
- ✓ Engage public health agencies, the Arthritis Foundation, American College of Rheumatology and American Academy of Orthopedic Surgeons to work with medical groups to inform providers about these interventions and with public and private health insurance plans to secure financing for them.
- ✓ Incorporate training about the existence and appropriate use of evidence-based interventions into relevant healthcare professions and medical school curricula as

> "Osteoarthritis is a crippling disease that threatens the ability of millions of Americans to live and age independently. Through its work with the Centers for Disease Control and Prevention, the Arthritis Foundation is helping to deliver advances in public health and arthritis research to those who are at risk or who are already impacted by the disease."
>
> The Honorable Herb Kohl (D-WI)
> *U.S. Senator,* Wisconsin
> *Chairman,* Senate Special Committee on Aging
> *Member,* Senate Appropriations Committee

well as curricula for primary care residents and subspecialty fellows.

- ✓ Use administrative databases to remind physicians to initiate evidence-based interventions when an OA diagnosis appears or progresses.

For policy makers, we must:

- ✓ Develop a message platform to reach policy makers with targeted policy recommendations.
- ✓ Create a communications plan for federal policy makers that encompasses targeted advertising, Congressional educational visits, media messages, grassroots efforts and partnership integration.
- ✓ Support federal, state, local and organizational policies that support OA goals, including reduced joint injury, reduced obesity, improved physical activity and weight management, and expanded access to self management education.

For employers and business community, we must:

- ✓ Develop strategies and tools to attract employers and insurers to implement policies for referrals, reimbursements or health communication strategies for addressing OA.
- ✓ Promote incentives for implementing evidence-based programs in the worksite.
- ✓ Encourage these groups to support state and local programs and services geared at reducing the economic and social costs of OA.

For communities, we must:

- ✓ Develop and distribute marketing information to community organizations that may be unaware of or not utilizing the effective intervention strategies.
- ✓ Develop or tailor existing grassroots materials with a focus on how to implement and market effective interventions.
- ✓ Support community-level policy and system change efforts that improve the nutrition, physical activity, and injury prevention environments.

Strategic Alliances

Lastly, but undoubtedly most importantly, full implementation of the OA Blueprint for Action requires a constellation of forces aligned and equipped to tackle this important problem. To move the nation from complacency to action, we need to integrate policy, engage partner organizations and policy makers, connect messages toward common goals, and generate large-scale synergy among multiple stakeholders. Given the overlap of the National Agenda with other chronic disease efforts and the current fiscal constraints, strategic alliances are key to achieving sustained commitment for advancing the public health agenda. Only through the combined creativity, innovation and resources of the vast array of public and private sector partners at national, state and community levels can we truly make difference.

Strategic Partners

- Federal and state agencies
- Aging networks and agencies
- Community organizations
- Employers and businesses
- Education agencies
- State parks and recreation departments
- Professional associations
- Foundations
- Non-profit organizations
- Minority organizations
- Healthcare systems
- Provider networks
- Insurers and healthcare payers
- Sports and fitness organizations
- Faith based or religious organizations
- Organizations serving or representing underserved and/or priority populations


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V. The Research Horizon

Much high quality research and evaluation is currently underway to discover new and improved ways to prevent and manage OA. Critical questions remain, however, and should be pursued in the context of a broad, fully funded public health research agenda for OA. Priority research related to the four recommended interventions strategies were highlighted in Section III of this National Agenda; additional research and evaluation needs are presented below. As new findings emerge, they should be integrated into *A National Public Health Agenda for Osteoarthritis*, disseminated widely and efficiently translated into practice.

Enhance Surveillance

Clinicians and others know that OA comprises most of what we call arthritis. While general arthritis surveys provide a rough guide to OA and its impact, national estimates of OA prevalence depend on data from the first National Health and Nutrition Examination Survey (NHANES-I)—a 1971-1975 survey and the most recent national OA survey available. Such old data may not reflect what is happening with OA in today's world, where overweight and obesity, physical inactivity, longer work days and other OA risk factors may be increasing the impact of OA in ways we are not able to measure well.

- ✓ We must fund a contemporary NHANES to provide prevalence and impact of OA at various joint sites, along with estimates of disparate impact, risk factors, adverse outcomes and natural history.
- ✓ We must add questions about OA to large randomized clinical trials that are examining other chronic diseases such as heart disease or diabetes.

Combine Prevention Interventions

Individuals have various sets of determinants for the onset and/or progression of OA and will have varying responses to specific interventions. To maximize the prevention of OA and its associated consequences, a combination of evidence-based interventions (e.g., self management education, physical activity, weight management and injury prevention) should be considered and tested in population settings. This approach would be analogous to the Multiple Risk Factor Intervention Trial (MRFIT) undertaken to prevent coronary artery disease.

- ✓ We must develop and perform research on a multiple risk factor intervention for the prevention of incident OA and progressive OA-associated structural damage, symptoms, activity limitation, reduced quality of life, and participation restriction for persons with and at risk for knee OA.

Explore Early Diagnosis and Treatment

OA is a slowly developing disease, which makes diagnosis and the assessment of intervention effectiveness difficult. There is as yet no evidence

that early diagnosis and therapeutic intervention leads to better clinical and radiological outcomes for OA. While several risk factors have been identified that are associated with the onset and progression of knee OA (and to a lesser extent other joints affected by OA), no prevention research to date has proven that early diagnosis via screening coupled with alteration of these risk factors leads to better OA radiologic or clinical outcomes.

The major research priority for developing screening and early treatment strategies is the identification of valid and responsive markers of joint damage with which to detect early disease in those at risk for OA. Research on the efficacy of early treatment is hampered by the insensitivity to change of the standard x-ray which is currently the standard for OA-related structural damage. The availability of more sensitive biomarkers and/or image markers of joint structural damage would obviate this problem, taking care to minimize the harms of increased radiation exposure.

- ✓ We must identify valid and responsive markers of OA structural damage.

Evaluate Workplace Interventions

Despite the heavy burden of OA on many workers, no published studies describe or evaluate occupational interventions specifically focused on OA. Much work remains to understand the underlying mechanisms and potential interventions for OA related to occupational risks. Expanded implementation of effective interventions in the workplace could reduce pain and psychological anguish, improve productivity rates and morale, and decrease economic costs for employers.

- ✓ We must develop an in-depth understanding of the underlying mechanisms involved with work-related OA onset and progression in order to develop effective interventions for occupational prevention and management.
- ✓ We must investigate the occupation-specific progression of OA over the occupational lifespan of workers.
- ✓ We must evaluate intervention effectiveness in occupational settings as well as the role of the workplace as a setting to disseminate known effective interventions such as physical activity programs and self management education.

Examine Emerging Interventions

As new technologies and interventions emerge, the effectiveness and public health relevance must be evaluated. Two examples follow.

Biomechanics

Several biomechanical interventions have been studied to determine their impact on reducing chronic knee pain and improving function among persons with symptomatic OA of the knee. They include patella taping, osteotomy, knee bracing, lateral heel wedges and canes. Of these interventions, only one — patella taping (when tape is applied to exert a medially-directed force on the patella) — has been shown to produce a clinically meaningful change in chronic knee pain and function with little risk.[92,93]

At present, patella taping requires access to the healthcare system. Individuals would first need to be appropriately diagnosed with symptomatic knee OA. Once diagnosed, patella taping can be administered by a trained allied health practitioner. This practice is already

widespread; however, further promotion of the taping technique and dissemination of the evidence supporting this intervention would be beneficial, particularly if coupled with muscle strengthening, which has long-term benefits. Similarly, administration of the other interventions (lateral heel wedges, insoles, and other alternative footwear) requires involvement of a health professional to make an accurate diagnosis and recommend the appropriate intervention, which limits the utility of many biomechanical interventions to be implemented as public health interventions.

As of yet, none of these interventions has been tested in a public health setting nor is there any evidence that any of them have an effect on disease incidence or structural progression. Thus, before any of the interventions could be implemented and sustained on a community-based level, their efficacy in public health settings should be replicated and confirmed.

- ✓ We must test the effectiveness of the biomechanical interventions that have demonstrated efficacy in reducing OA symptoms in a variety of public health settings.
- ✓ We must determine the effect of interventions that have important effects on mechanical loading, entail little risk, and may have substantial impact in a public health setting if appropriately tested, such as alternative footwear, canes, soft orthoses, reducing heel height, and modified shoes.

Mind/Body

Mind/body interventions focus on the interactions among the brain, mind, body and behavior, and on the powerful ways in which emotional, mental, social, spiritual and behavioral factors can directly affect health. Initial findings suggest selected mind/body interventions may result in favorable changes in some relevant clinical OA outcomes for individuals burdened with OA. The efficacy of Tai Chi, the mind/body approach most studied, has been mixed but those studies yielding favorable results demonstrated that Tai Chi was associated with meaningful improvements in pain and physical function comparable to effect sizes accompanying other common self-management approaches such as non-steroidal anti-inflammatory drug (NSAID) use and exercise. These studies point to the potential benefit of this specific mind/body approach for OA patients.

- ✓ We must conduct further randomized control trials specifically targeting persons with OA to determine the efficacy of mind/body approaches to reduce pain, fatigue, activity limitation and participation restriction and to improve mental health outcomes.
- ✓ We must determine the potential feasibility and benefits of mind/body interventions in samples of persons with OA characterized by different age groups and more cultural diversity.
- ✓ We must examine the extent to which the feasibility of delivering mind/body techniques is impacted by the need for education/training from a qualified professional and consistent practice-related proficiency on the part of the participant to benefit from these techniques.

Glossary

Dietary Supplement: Defined by Congress in the Dietary Supplement Health and Education Act (DSHEA) of 1994, a dietary supplement is a product taken by mouth that contains a "dietary ingredient" intended to supplement the diet. The "dietary ingredients" in these products may include: vitamins, minerals, herbs or other botanicals, amino acids, and substances such as enzymes, organ tissues, glandular, and metabolites. Dietary supplements can also be extracts or concentrates, and may be found in many forms such as tablets, capsules, softgels, gelcaps, liquids and powders.

Source: Allen L, de Benoist B, Dary O, and Hurrell R, editors. Guidelines on food fortification with micronutritients. World Health Organization, Food and Agricultural Organization of the United Nations. 2006.

Disability: A medical condition that captures impairments, activity limitations, and participation restrictions in an individual's daily life. Traditionally, disability measures have been limited to activity and participation restrictions under the following categories:

a) *basic activities of daily living* including tasks such as toileting, getting in and out of bed and dressing oneself;

b) *mobility* or the ability to transport oneself from one location to another using lower extremity function; and

c) *instrumental activities of daily living* that involve more complex abilities related to participation in social roles such as doing light house work, visiting relatives, or being able to care for a family member. Disability can be assessed using both self-report and performance based measures.

Source: The ICF web site http://www.who.int/classifications/icf/en/ and Katz, S. Assessing self-maintenance: activities of daily living, mobility, and instrumental activities of daily living. *Journal of American Geriatric Society* 1983;31:721-727.

Disability Concepts in International Classification of Functioning, Disability and Health (ICF) Model:

Impairment: Problems in body function or structure, such as a significant deviation or loss

***Activity limitations*:** Difficulties that an individual may have in executing activities

Participation restriction: Problems that an individual may experience in involvement in life situations

Source: The Future of Disability in America, Committee on Disability in America Board on Health Sciences Policy. Marilyn J. Field and Alan M. Jette, Editors, Institute of Medicine of the National Academies, The National Academies Press, Washington, DC, 2007. http://www.nap.edu/catalog.php?record_id=11898

Effectiveness: Improvement in health or behavioral outcome produced by an intervention in a community setting.

Source: The Community Guide to Preventive Health Services http://www.thecommunityguide.org/

Environmental Modifications: Adaptations to homes, schools, worksites, communities, and neighborhoods to accommodate physical limitations and disability due to arthritis. These modifications include things such as ramps, grab bars, smooth walkways, and wheelchair assessable doors.

Evidence-based Method: A strategy for explicitly linking public health or clinical practice recommendations to the underlying scientific evidence that demonstrates effectiveness.

Source: The Community Guide to Preventive Health Services http://www.thecommunityguide.org/

Exercise: A subcategory of physical activity that is "planned, structured, and repetitive and purposive in the sense that the improvement or maintenance of one or more components of physical fitness is the objective."

Source: 2008 Physical Activity Guidelines for Americans. Washington, DC: U.S. Department of Health and Human Services, 2008. Available at http://www.health.gov/paguidelines/guidelines/glossary.aspx

Health-related Quality of Life: Quality of life (QOL) is a term that conveys an overall sense of well-being, including aspects of happiness and satisfaction with life as a whole. Health is an important domain of overall quality of life. Other domains that contribute to QOL include jobs, housing, schools, and the neighborhood as well as aspects of culture, values, and spirituality. Health-related QOL (HRQOL) encompasses aspects of overall QOL that have been shown to affect physical or mental health.

Source: Adapted from Centers for Disease Control and Prevention. *Measuring Healthy Days*. Atlanta, Georgia: CDC, November 2000.

Mind-Body Interventions: Interventions focused on the interactions among the brain, mind, body, and behavior, and on the powerful ways in which emotional, mental, social, spiritual, and behavioral factors can directly affect health. Examples of mind-body interventions include relaxation, hypnosis, visual imagery, meditation, yoga, biofeedback, tai chi, qigong, cognitive-behavioral therapies, group support, autogenic training, and spirituality.

Source: Adapted from the National Center for Complementary and Alternative Medicine website http://nccam.nih.gov/

Neuromuscular Conditioning Program: A specific-exercise program that "teaches" proper body mechanics to aid in lower extremity stability designed to reduce the risk of some musculoskeletal injuries (e.g., ACL injuries). No standardized program exists, but the following components are considered essential:

- muscle strengthening
- plyometrics (jump training)
- balance exercises
- proper technique coaching.

Source: Hewett TE, Ford KR, Myer GD. Anterior cruciate ligament injuries in female athletes, Part 2: A meta-analysis of neuromuscular interventions aimed at injury prevention. *American Journal of Sports Medicine* 2006;34(3):490-498.

Obesity: A chronic medical condition that is characterized by excessive body weight. As defined by body mass index (BMI), Class I obesity is a BMI of 30.0 – 34.9; Class II obesity is a BMI of 35.0 – 39.9, whereas Class III obesity is a BMI of 40+.

Source: National Heart, Lung, and Blood Institute (NHLBI). Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults: The evidence report. *Obesity Research* 1998: 6:51S209S.

Osteoarthritis: A joint disease caused by genetic, local mechanical stresses and systemic factors, and other unknown factors that leads to articular cartilage loss, boney overgrowth and other bone changes, and potential alterations in the ligaments, menisci, and muscles. Symptoms include joint pain, stiffness and weakness which can be disabling and result in surgical joint replacement. Physical examination findings include boney swelling and loss of joint range of motion. Articular cartilage loss and bone changes can be detected by x-ray. MRI can assess the ligaments, menisci, and muscles as well. In clinical and epidemiologic studies, osteoarthritis is often defined by:

- self-report of joint symptoms,
- self-report of healthcare provider diagnosis,
- radiographic findings, and/or
- a combination of 2 or more of the above.

For instance, in large epidemiologic surveys, self-report of joint symptoms can be used to identify those with "possible arthritis." However, to identify those with "osteoarthritis," a self-report of a healthcare provider's

diagnosis of "osteoarthritis" might be required. Similarly, in clinical and epidemiologic studies that include x-ray assessments, "osteoarthritis" might be defined radiographically, but a definition of "symptomatic osteoarthritis" would also require the presence of self-reported symptoms.

Source: Moskowitz RW, Altman RD, Buckwalter JA, Goldberg VM, Hochberg MC. *Osteoarthritis: Diagnosis and medical/surgical management*. 4th ed. Lippincott Williams & Wilkins (LWW), 2007.

Overweight: Excessive body weight with a body mass index (BMI) of 25 to 29.9.

Source: National Heart, Lung, and Blood Institute (NHLBI). Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults: The evidence report. *Obesity Research* 1998: 6:51S209S.

Pain: A sensory and emotional experience of discomfort. It is usually associated with actual or threatened tissue damage and is influenced by cognitive processes as well as the social and cultural context in which it is embedded.

Source: Sarafino EP. *Health psychology: Biopsychosocial interactions*. New York: John Wiley & Sons, 1994.

Physical Activity: Any bodily movement produced by the contraction of skeletal muscle that increases energy expenditure above a basal level. Among the ways physical activity can be categorized is according to mode, intensity, and purpose.

Mode: The type of activity or exercise that is being performed. Biking, walking, rowing, and weight lifting are all examples of different modes of activity.

Frequency: The number of times an exercise or activity is performed. Frequency is generally expressed in sessions, episodes, or bouts per week.

Intensity: How much work is being performed or the magnitude of the effort required to perform an activity or exercise.

Purpose: The context in which physical activity is performed. Commonly used categories include occupational, leisure-time or recreational, household, self-care, and transportation or commuting activities. In some studies, sports participation or "exercise training" is assessed and analyzed separately from other leisure-time activities.

Source: 2008 Physical Activity Guidelines for Americans. Washington, DC: U.S. Department of Health and Human Services, 2008. Available at http://www.health.gov/paguidelines/guidelines/glossary.aspx

Prevention

Primary prevention: Identifying factors that increase the risk of osteoarthritis and intervening to reduce the occurrence of osteoarthritis.

Secondary prevention: Screening and utilizing other means to assure early diagnosis and treatment of osteoarthritis (perhaps even before it becomes symptomatic) to prevent subsequent pain and disability associated with osteoarthritis.

Tertiary prevention: Utilizing interventions, including medical and self-management strategies, to limit the long term impact of pain, disability and other effects of the disease once it is established.

Source: National Arthritis Action Plan http://www.arthritis.org/naap.php#prevention

Public Health Intervention: An intervention (activity) that prevents disease, injury, or disability or promotes health in a group of persons. These interventions are distinguished from individual clinical interventions.

Source: Adapted from *The Community Guide to Preventive Health Services* http://www.thecommunityguide.org/

Public Health Practitioners: Persons responsible for providing public health services to groups of individuals in a variety of settings, such as public health agencies, managed care plans, community health centers, and academic institutions. Persons who occasionally contribute to public health activities in the course of fulfilling other responsibilities are not included under this term.

Source: The Community Guide to Preventive Health Services http://www.thecommunityguide.org/

Self Management: The tasks that the individuals must undertake to live well with one or more chronic conditions. These tasks include having the confidence to deal with medical management, role management, and emotional management of their conditions.

Source: Adams K, Greiner AC, Corrigan JM. (Eds) Report of a summit. *The 1st annual crossing the quality chasm summit—A focus on communities.* 2004. Washington DC National Academies Press.

Self Management Education: Interactive educational interventions specifically designed to enhance patient self-management. Self-management education is patient driven and focuses on building generalizable skills such as goal setting, decision making, problem solving, and self-monitoring.

Source: Adapted from Chapter on Self Management Education and Support from the *Clinical Care in the Rheumatic Diseases*

Self Management Support: The systematic provision of education and supportive interventions by healthcare or other providers to strengthen patients' skills and confidence in managing their health problems; includes regular assessment of progress and problems, goal setting, and problem solving support.

Source: Adapted from Adams K, Greiner AC, Corrigan JM. (Eds) Report of a summit. *The 1st annual crossing the quality chasm summit—A focus on communities.* 2004. Washington DC National Academies Press.

Workplace Intervention: A method (or methods) used in the workplace that is designed to reduce the incidence or severity of osteoarthritis in that given occupational group.

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Acknowledgments

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www.cdc.gov/arthritis/docs/OAagenda.pdf

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