

## APPENDIX 17–B

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# TWO EXAMPLES OF A CHRONIC DISEASE PREVENTION WORKSHEET ADDRESSING PRIMARY, SECONDARY, AND TERTIARY APPROACHES TO OSTEOPOROSIS

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### Example 1

**Target disease:** Osteoporosis

**Target group:** White females

**Healthy People 2010 Objective:** Increase calcium intake so at least 50% of youth aged 12 through 24 and 50% of pregnant and lactating women consume 3 or more servings daily of foods rich in calcium, and at least 50% of people aged 25 and older consume 2 or more servings of milk and milk products daily.

**Background:** Osteoporosis is a disease in which bone mass lowers and bone tissue deteriorates, significantly increasing one's risk for fractures, especially of the hip, spine, and wrist. The literal translation is "porous bone." It has been described as a pediatric disease with a geriatric outcome. This is because the peak bone mass that an individual forms in his or her first 20 to 25 years of life will serve as his or her best defense for good bone health throughout his or her life.

It is prevalent in 55% of American adults 50 years and older. Of the 10 million Americans afflicted with osteoporosis, 8 million are women and 2 million are men. Although it is thought of as a disease of older people, it can occur at any age. The large prevalence found in women is largely due to

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*Source:* Adapted with permission from Perlman S. Graduate Student in Nutritional Science. California State University, Long Beach; May 4, 2005.

the 5 to 7 years following menopause in which they can lose up to 20% of their bone mass. Being white and a woman qualify as 2 of the risk factors for osteoporosis. About 20% of white women aged 50 or more years are estimated to have osteoporosis. Also, 52% of white women 50 years or older are estimated to have low bone mass. The risk factors associated with osteoporosis are as follows:

- History of fracture at 50 or more years
- Low bone mass
- Fracture history in first-degree relative
- Being female
- Thin or small frame
- Advanced age
- Family history of osteoporosis
- Estrogen deficiency
- Amenorrhea
- Anorexia nervosa
- Low lifetime calcium intake
- Vitamin D deficiency
- Use of medications such as corticosteroids or anticonvulsants
- Chronic medical conditions
- Low testosterone levels in men
- Inactive lifestyle
- Cigarette smoking
- Excessive use of alcohol
- Being white or Asian

The key lifestyle behaviors that can help reduce one's risk of osteoporosis are to have a diet rich in calcium and vitamin D, to perform weight-bearing exercises, to not smoke or excessively consume alcohol, and to have bone density testing and medication when needed. Osteoporosis is a highly preventable disease, but in the case that a postmenopausal woman is at high risk of developing it or has already developed it, there are a number of different medications that can be used such as bisphosphonates, calcitonin, estrogen therapy, parathyroid hormone, and selective estrogen receptor modulators (SERMs).

### Prevention/Treatment Approach for White Females

***Infant to Preschooler (RDA: birth to 1 year old 400-600 mg Ca/d, 1 to 5 years old 800 mg Ca/d)***

**Primary prevention:** Note: actual program is discussed at end of this section.

- Pregnant/nursing mothers will be instructed to obtain adequate amount of calcium (RDA of 1,200 mg) and vitamin D (RDA: 10 µg) so that the infant will get enough calcium and vitamin D during initial development.
- Once the child is able to eat solid foods, parents will be instructed to incorporate dairy products (e.g., milk, cheese, yogurt) and calcium-rich vegetables and legumes regularly into meals.
- Parents will be also be instructed to incorporate vitamin D-rich foods into their children's meals to meet the adequate intake (AI) of 5 µg/d vitamin D (e.g., fortified dairy products and cereals, and animal products such as beef, eggs, and salmon).
- Parents will be instructed to have their children do the following:
  1. Perform weight-bearing exercises at least 3 times a week (e.g., running, tennis, soccer).
  2. Be exposed to sunlight at least 10-15 minutes a day to allow vitamin D synthesis via their body.

- Possible programs to facilitate providing this information to families: Have parents and children (ages 3 to 5) come to the community center once a week. Provide the children with a calcium-rich meal, and if they are old enough, they can participate in weight-bearing exercises in the gym. While the children are being taken care of by program staff, parents will be brought into a classroom setting and taught how to meet the above objectives by a registered dietitian and exercise physiologist. Have a second program for pregnant or nursing mothers to come in for an education and meal planning workshop with a dietitian, so that they will learn the importance of planning meals for their children once they finish breastfeeding and understand how to incorporate calcium-rich foods and outdoor activity into their children's lives.
- Contact the Dairy Council to help develop promoting dairy products that young children will enjoy. They can sponsor developing brochures/pamphlets that explain the health benefits of eating dairy products.
- Work with the National Osteoporosis Foundation (a nonprofit group) to develop teaching strategies, get supplemental information for participants, and invite guest speakers.

**Secondary prevention:** If genetic or metabolic disorders that affect the development or maintenance of bone occur, larger amounts of calcium may be required and vitamin D may need to be supplemented. Pamphlets offering nutrition counseling services can be distributed to pediatric offices so that pediatricians and parents can arrange appointments if they are deemed necessary. A weekly session could be arranged at a central hospital in which, similar to the program presented previously for primary prevention, children can have a calcium-rich meal and then exercise (weight bearing) to the degree they are able while their parents receive nutrition education nearby. Also, have them meet with their doctors to discuss treatment medications that will help slow their bone loss.

**Tertiary prevention:** At the stage of what would be rickets at this age group, calcium and vitamin D supplementation should be followed to the degree necessary. Exercise to the degree one is able should be performed with the assistance of a physical therapist. A clinical nutritionist at the patient's hospital should develop a diet and supplement plan. Also, it should be confirmed that the individuals are on medications that will help slow their bone loss.

***Youth (6 to 18 years old) (RDA: 4 to 8 years old is 800 mg Ca/d, 9 to 18 years old is 1,300 mg Ca/d)***

**Primary prevention:**

- Use the approaches suggested for infants and preschoolers previously, but gear toward the youth age group. Parents will be taught how to incorporate age-appropriate, calcium-rich foods into their children's diets, and creative ways to do so. Parents will also be taught about the increasing RDA for calcium and how to meet these higher goals. Vitamin D-containing foods, weight-bearing exercise, and regular sun exposure will be encouraged. The program suggested for the previous age group can be used for the younger kids within this youth category, ages 6-12, adjusting to the different RDAs and exercise ability levels.

- Now that the children are of school age, nutrition education can be implemented. Class exercises will be developed for elementary school children to connect thoughts of health to healthful eating. For example, activities for a first-grade class would be to draw pictures of skeletons and have kids talk about their favorite kinds of milk, cheese, and yogurt (strawberry yogurt, chocolate milk, blueberry yogurt, ice cream) that will make their skeleton strong. As the older grades are approached, a more in-depth explanation about forming strong bones by eating calcium-rich foods and doing weight-bearing exercises can be given. In high school, nutrition education can be developed with an emphasis on building strong bones and why it is so important to do so in their youth.
- Promote DARE-like programs that educate middle school and high school students about the health risks of smoking and drinking.
- Work with nonprofit organizations such as the NFO and profit-based groups such as the Dairy Council to put together school assemblies.
- Encourage outdoor activities in which youth will get weight-bearing exercise and get sunlight for vitamin D synthesis.

**Secondary and tertiary prevention:** Prevention is rare due to the very low incidence within this age group. Plans similar to the ones described in the infant/preschooler intervention should be used.

***Adults (RDA: 19 to 50 years old is 1,000 mg Ca/d, 51 years old and older, 1,200 mg Ca/d)***

**Primary prevention:**

- Adults ages 19-30 will be encouraged to consume their RDA of calcium in order to maximize their bone density. Adults 30 and older will be advised to meet their calcium recommendation in order to slow bone resorption. Education is key in this level of prevention. Information will be provided in community places such as health fairs, community events, and doctor's offices. Certified nutrition professionals will attend health fairs and community events to assess participants' daily calcium intake from a food frequency questionnaire and explain how to better reach their calcium goals.
- Information offered will cover calcium-rich foods, vitamin D AI sources and AI requirements (19 to 50 is 5 µg/d, 51 to 70 is 10 µg/d, 70 and over is 15 µg/d), necessary sunlight exposure, helpful weight-bearing exercises, and risk factors.
- Nonprofit and for-profit organizations will be involved in developing materials geared toward this population and organize community information sessions for the public.
- Dietitians will further educate the population on calcium supplements and stress that they should be used if one has problems reaching his or her RDA from foods within the diet at these events.
- Promote regular screenings for osteoporosis by doctors and health clinics.
- Flyers will be distributed to doctor's offices, offering information and evaluation services to community groups if requested (e.g., the school PTA).

**Secondary prevention:**

- Educate adults on all of the information mentioned in primary prevention because loss of bone mass can be slowed down by following those recommendations.
  1. Have an RD available to set up appointments with people diagnosed with osteoporosis to help them develop an eating (and possibly supplementation) plan to help them meet their calcium needs.
  2. Have an RD make the participants schedule an exercise regimen (walking is probably easiest).
  3. Have adults meet with their doctors to discuss treatment medications that will help slow their bone loss.
  4. Stress that participants need to get outside in the sun at least 15 minutes a day and eat foods with vitamin D.
  5. Eliminate behavioral risk factors such as smoking, excessive drinking, or living a sedentary lifestyle. Assist these behavior changes by developing exercise programs to improve their general health and deter them from bad habits. Refer them to 12-step programs, if necessary.

**Tertiary prevention:**

- Provide information about the drugs that can help protect adults' bones from fracture so they can further discuss them with their doctors.
- Encourage calcium and vitamin D supplementation.
- Develop simple exercises that adults 70 year old and older can tolerate without risk of injury and teach the exercises to them encouraging them to do them regularly on their own.
- Explain that they need to get outside in the sun. Recommend recreation activities offered locally in the area that they would enjoy and help them achieve their sunshine goals.

***Elderly (RDA: 70 or more years is 1,200 mg Ca/d)*****Primary prevention:**

- Educate elderly adults on RDA for calcium and sources. If they are assessed as not meeting their daily goals, help them make a plan to get them closer to achieving those goals.
- Develop an exercise plan that provides low risk impact on bones.
- Encourage going outdoors to get some sunlight.
- Provide talks in various community centers where you would find the elderly, such as senior centers and AARP meetings.

**Secondary prevention:** Distribute flyers at community centers such as senior centers and AARP meetings that explain when and where seniors can locally find the following services:

- Referrals to doctors who will help with medications to slow the rate of bone mass loss.
- Provide information on calcium supplements that will help them reach their goal of 1,200 mg Ca/d.

- Structure medical nutrition therapy for a healthy lifestyle:
  - Make sure they get outside at least 15 minutes a day in order for their body to produce vitamin D and supplement if necessary to help reach the goal of 15 µg/d vitamin D.
  - Have an RD available to help develop eating habits to increase calcium and vitamin D intake.
  - Explain risk factors and encourage eliminating the behavioral ones. Propose ways in which they can change their behaviors.

**Tertiary prevention:** Discuss the following at community centers and events, and distribute pamphlets to those locations and to doctors' offices, including all of the information listed below for people who can't make it to the events.

- Provide information about the drugs that can help protect their bones from fracture.
- Encourage calcium and vitamin D supplementation.
- Develop simple exercises that this group can tolerate without risk of injury.
- Explain that they need to get outside in the sun. Suggest simple activities that they would enjoy outdoors and have them identify which ones they think are realistic.

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## Resources

National Osteoporosis Foundation. Available at: <http://www.nof.org/patientinfo/medications.htm>.

Osteoporosis Treatment Web Site. Available at: <http://www.osteoporosis-treatment.net>.

Frank-Spohrer G. *Community Nutrition: Applying Epidemiology to a Contemporary Practice*. 1st ed. Gaithersburg, Md: Aspen Publication; 1996:536-542, 553.

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## Example 2

**Target disease:** Osteoporosis

**Target group:** 50- to 65-year-old white women

**Healthy People 2010 objective:** Reduce the number of adults with osteoporosis

**Background:** Osteoporosis is defined as porous bone. It is characterized mainly by low bone mineral density (BMD) and structural deterioration of bone tissue leading to the expansion of spaces within the bone. Consequences of osteoporosis include increased fragility and susceptibility to bone fractures. Risk factors for osteoporosis include the following:

- Women
- Age 50 or older

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*Source:* Adapted with permission from Kidd J. Graduate student in nutritional science. California State University, Long Beach; May 4, 2005.

- Family history of osteoporosis
- White
- Thin/small body frame
- Long-term low calcium intake
- Vitamin D deficiency
- Inactivity
- Use of certain medications, such as glucocorticoids and anticonvulsants
- Lifestyle factors such as cigarette smoking and excessive alcohol consumption

The prevalence of osteoporosis is increasing. The following are some statistics that describe the problem of osteoporosis in the United States:

- It is estimated that 10 million Americans have osteoporosis.
- Approximately 34 million Americans are thought to be at increased risk for developing osteoporosis due to low bone mineral density.
- About 55% of people 50 years old and over already have or are at risk of developing osteoporosis.
- About 80% of those who already have this chronic disease are women, while only 20% are men.
- One in two women over 50 years old will have a fracture related to osteoporosis in her remaining lifetime, compared to 1 in 4 men.
- About 20-30% of white women 50 years old and over have osteoporosis compared with 5% of non-Hispanic black women and 10% of Hispanic women age 50 and over.

These statistics support the decision to target white women, age 50 and over, for prevention due to increased risks over other groups in the US population.

**Primary prevention approach:** The primary prevention approach is implemented before diagnosis with osteoporosis. The goal of this approach is to prevent development and diagnosis of the disease through dietary and physical activity lifestyle changes. These changes are learned through an osteoporosis prevention program outlined below.

### Healthy Bones

- This is a 6-week course with 1 day of class per week.
- Class periods will be divided into 2 parts lasting 45 minutes each of diet and exercise.
- Participation will be restricted to 50- to 65-year-old white women referred by a physician if they show risk factors for developing osteoporosis.
- Each course will have a maximum enrollment of 20 women.
- The diet component of the course will consist of cooking classes to incorporate calcium-rich foods into the diet in a palatable manner to increase dietary calcium consumption. One recipe will be used each week. And the end of the 6-week session, participants will be given a recipe book with each cooking demonstration recipe included. Additional calcium-rich recipes will also be included in this recipe book to supply the participants with a wider variety of recipe ideas to work with at home. Each cooking demonstration will be accompanied by a lesson about how certain diet components can have a positive effect on prevention of osteoporosis.
- The exercise component of the course will be focused on weight-bearing exercise and resistance training on alternating weeks. The participants

will learn various exercises (both weight-bearing and resistance training) that help maintain bone strength. They will learn specific exercises and sets to continue on their own at home or at a gym. At the end of each exercise session, the participants will be provided a handout illustrating the exercises learned that day to use as a reference for replicating the sets on their own. Lessons will include discussion of various risk factors for developing osteoporosis and how to reduce these risk factors.

**Secondary intervention approach:** The secondary intervention approach is implemented following a patient's diagnosis with osteoporosis. The goal of this approach is to maintain the current bone mineral density and, if possible, improve bone mineral density to reverse the effects of osteoporosis. This will be achieved through a more intimate class setting focusing on individualizing diets and exercise routines.

### Strong Bones

- This is a 12-week course with 1 day of class per week.
- Class periods will be divided into 2 parts lasting 45 minutes each of diet and exercise.
- Participation will be restricted to 50- to 65-year-old white women who have recently been diagnosed with osteoporosis and who have been referred by a physician.
- Each course will have a maximum enrollment of 10 women.
- The diet component of the course will consist of evaluating the participant's dietary intake for consumption of calcium and vitamin D. Depending on the level of intake for these nutrients, the participants will be encouraged to increase intake through diet and supplements. Participants will be encouraged to gain sun exposure for approximately 30 minutes each day to increase vitamin D production in the skin. All participants will have a goal of 1,200 mg of calcium intake each day from diet and supplements. Lessons to correlate with the diet component of the class will include the following topics: dietary sources of calcium, dietary sources of vitamin D, recipes, and cooking demonstrations for incorporating these foods into the diet, choosing calcium supplements, and combating contributory risk factors such as smoking and alcohol consumption, etc. Participants will be provided with a recipe book at the end of the 12-week session.
- The exercise component of the course will be focused on weight-bearing exercise and resistance training on alternating weeks. The participants will learn various exercises (both weight-bearing and resistance training) that help maintain and/or restore bone strength. They will learn specific exercises and sets to continue on their own at home or at a gym. At the end of each exercise session, the participants will be provided a handout illustrating the exercises learned that day to use as a reference for replicating the sets on their own. Lessons included in the exercise component will consist of weight-bearing exercise, resistance training, balance therapy, fall prevention, etc.

**Tertiary intervention approach:** The tertiary intervention approach is implemented when a patient's osteoporosis diagnosis is complicated further with comorbidities. The goal of this approach is to reduce comorbidities and

consequences of low bone mineral density. This will be achieved through one-on-one therapy with dietitians and physical therapists.

### Rebuilding Bones

- This is a 12-week course with 3 days of class per week.
- Class periods will be divided into 2 parts, lasting 45 minutes each, consisting of diet and exercise.
- Participation will be restricted to 50- to 65-year-old white women, referred by a physician, who have been diagnosed with osteoporosis and who have suffered a hip fracture in the last 5 years.
- Classes will be conducted in a one-on-one fashion with a dietitian for diet therapy and physical therapist for exercise therapy.
- The diet component of the course will consist of evaluating the participant's dietary intake for consumption of calcium and vitamin D. Depending on the level of intake for these nutrients, the participants will be encouraged to increase intake through diet and supplements. The dietitian will work with participants to create a specialized meal plan including increased intake of calcium and vitamin D. Participants will have a goal of 1,200 mg of calcium intake each day from diet and supplements. Lessons to correlate with the diet component of the class will include the following topics: dietary sources of calcium, dietary sources of vitamin D, recipes, and cooking demonstrations for incorporating these foods into the diet, choosing calcium supplements, combating contributory risk factors such as smoking and alcohol consumption, grocery shopping for calcium-rich foods, etc. Participants will be provided with a recipe book and a shopping guide at the end of the 12-week session.
- The exercise component of the course will be focused on weight-bearing exercise and resistance training alternating weeks led by a physical therapist. The participants will learn various exercises (both weight-bearing and resistance training) to restore bone strength. They will learn specific exercises and sets to continue on their own at home or at a gym, supervised if necessary. At the end of each exercise session, participants will be given an individualized exercise schedule outlining and illustrating the exercises learned to use as a reference for replicating the sets on their own. Lessons included in the exercise component will consist of weight-bearing exercise, resistance training, balance therapy, fall prevention, etc.

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### Resources

- Healthy People 2010 Objectives for Improving Health*. Available at: [www.healthypeople.gov](http://www.healthypeople.gov).
- Lewiecki EM. Management of osteoporosis. *Clin Mol Allergy*. 2004;2(1):9. National Osteoporosis Foundation. Available at: [www.nof.org](http://www.nof.org).
- Tussing L, Chapman-Novakofski K. Osteoporosis prevention education: behavior theories and calcium intake. *J Am Diet Assoc*. 2005;105:92-97.