Bone Health Education: Program Integration and Community Partners are Essential for Success

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The New York State Osteoporosis Prevention and Education Program

- Osteoporosis Education Bill (New York State Public Health Law 2707) was signed in 1997.
- This bill established the NYSOPEP program within the New York State Department of Health.
- Helen Hayes Hospital served as coordinating center and later as the Statewide Osteoporosis Resource Center.
- www.nysopep.org

The Goal of NYSOPEP

- The goal of NYSOPEP is to provide education about the causes of osteoporosis, the value of prevention and early detection, and options for treatment.
- To provide professional and consumer information that is accurate, current, and research-based.

Outline

- Describe the public health impact of osteoporosis
- Describe useful community partnerships that have increased the outreach of programs
- Based on similar public health messages (nutrition, physical activity and tobacco cessation)
- Based on relationships between bone health/osteoporosis and other diseases
- Provide information on preventive measures to promote bone health and prevent falls and fractures
- Provide examples of primary, secondary and tertiary prevention including program outcomes regarding measures of positive behavior changes.

Definition of Osteoporosis

A skeletal disorder characterized by compromised bone strength predisposing a person to an increased risk of fracture. Bone strength primarily reflects the integration of bone quality and bone density.


Major Public Health Concern

- In the US, approximately 1 in 2 women and 1 in 4 men >50 yrs will have an osteoporosis-related fracture at some point in their life
- Fractures related to osteoporosis in women are more common than heart attack, stroke, and breast cancer combined
- Fracture costs are expected to increase from $19 billion to $25 billion by the year 2025
- In New York State, approximately 3 million women and men have osteoporosis or low bone mass.
- In 2000, fractures in New Yorkers cost $821 million.
Leading the Effort to Help Prevent and Treat Osteoporosis

Spine Fractures May Cause:
- Pain
- Loss of height
- Stoop posture - Dowagers hump
- Difficulty breathing
- Stomach pains/digestive discomfort
- Loss of self-esteem
- Increased risk for spine and other non-spine fractures (including hip fracture)

In the year following a vertebral fracture, almost 20% of women will experience another vertebral fracture.

12 Months

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Lindsay, R. Journal of the American Medical Association, Jan 17, 2001

Pathogenesis of Osteoporotic Fractures

Strong Bones are a Lifetime Commitment
- Remodeling - a constant process that replaces old bone with new bone
- Resorption - osteoclasts break down and remove old bone tissue
- Formation - osteoblasts lay down new bone tissue to replace old

Lindsay, R. Journal of the American Medical Association, Jan 17, 2001
Bone Mass by Age

Peak Bone Mass
- Defined as the maximum bone density an individual will ever have
- Fastest bone building occurs between ages 9 and 18 with PBM usually reached between ages 16 and 25
- That’s why osteoporosis has been called “a pediatric concern” with adult consequences

Peak Bone Mass

Risk Factors that Can’t Be Changed-But Education is Crucial!
- Family history of osteoporosis and/or fracture
- Advancing age
- Female gender (but men get osteoporosis too!)
- Ethnicity (esp. Caucasian, Asian, or Hispanic)
- Menopause (esp. at an early age - 45 or younger)
- Certain medications and/or medical conditions that may lead to bone loss or increase the risk for osteoporosis

Diseases/Conditions Associated with Osteoporosis
- Malabsorption (commonly associated with Crohn’s disease, celiac disease, liver disease)
- Hyperthyroidism
- Rheumatoid Arthritis
- Diseases associated with immobility or bed rest for more than 6 months (stroke, Parkinson’s disease, other disabilities)
Medications that Can Increase the Risk of Bone Loss or Fractures

- Steroid medications (such as cortisone and prednisone) >3 months
- Methotrexate
- Excess Thyroid hormone replacement
- Depo-Provera for birth control
- Aromatase inhibitors- Arimidex, Aromasin, Femara
- Chemotherapy
- Antiestrogen medications (only some such as Dilantin or phenobarbital)
- Androgen Deprivation Therapy for prostate cancer
- Certain oral medications for diabetes (thiazolidinediones such as Actos, Avandia)
- Proton pump inhibitors (PPIs) such as Nexium, Prilosec, Prevacid
- Selective Serotonin Reuptake Inhibitors (SSRIs) such as Lexapro, Prozac, Zoloft, Paxil, Effexor

Asthma and Bone Health

- Asthma itself, does not pose a threat to bone health.
- Oral Corticosteroids can impact calcium metabolism, decrease bone formation and interfere with production of sex hormones. Use minimal doses needed to control asthma.
- Glucocorticoids, such as cortisone and prednisone (≥ 5 mg/d of prednisone or equivalent for ≥ 3 months) can lead to bone loss. BMD testing is recommended.
- Asthma sufferers may think that milk and dairy products trigger asthmatic attack. Promote a healthy diet with adequate calcium and vitamin D, provide alternate sources.
- People with asthma may avoid weight-bearing physical activities. Promote physical activity within personal limits

Arthritis and Bone Health

- People with OA are less likely to develop osteoporosis. However, people with RA are more likely than average to develop osteoporosis.
- Medications used to treat RA can contribute to osteoporosis.
- Limitations in physical activity increase the risk of osteoporosis.
- Osteoporosis and arthritis both benefit from exercise programs that emphasize stretching, strengthening, posture, and range of motion.

Diabetes and Osteoporosis

- Adult women with type 1 diabetes have decreased bone mass, increased fracture risk, and delayed fracture healing compared with healthy women without diabetes.
- Women with type 1 diabetes have 6.9 to 12 times the risk of hip fractures as women without diabetes.
- Patients with Type 1 diabetes have impaired osteoblastic maturation and function.
- Patients with type 2 diabetes usually do not have a decreased bone mass.
- There may be higher fracture risk in type 2 patients despite normal bone mass. Other factors, such as neuropathy and impaired vision, may contribute to the increased fracture risk.
- Increased incidence of bone fracture in patients using thiazolidinedione (TZDs; such as Avandia, Actos).

Type I Diabetes and Vitamin D

- In three separate studies, breastfeeding mothers and children who received Vitamin D supplements were 60% less likely to develop Type 1 diabetes.
- Infants who receive the recommended daily dose of vitamin D may have a lower risk of developing type 1 diabetes.
- Taking cod liver oil during the first year of life greatly lowered the risk of type 1 diabetes in infants in Norway.
Type 2 Diabetes and Vitamin D

- High levels of vitamin D were associated with a decreased risk of type 2 diabetes in non-Hispanic whites and Mexican Americans.
- Many studies have linked vitamin D deficiency to an increased risk of type 2 diabetes.
- When vitamin D pills were given to Type 2 diabetics during the winter, it improved control of their blood sugar levels.

Cancer and Osteoporosis

Factors contributing to bone loss in Leukemia/Lymphoma:
- Involvement of bone marrow by cancer cells, which produce activators of bone loss.
- Many treatment programs include cortisone-like drugs which cause bone loss.

Factors contributing to bone loss after Breast Cancer:
- Chemotherapy for premenopausal women often results in early menopause, and estrogen replacement is not used.
- Aromatase inhibitors cause bone loss by lowering the levels of endogenous estrogen.

Factors contributing to bone loss in Prostate Cancer:
- Involvement of bone by cancer cells.
- Treatment strategies frequently include reduction or blockade of testosterone effects.
- Testosterone deficiency increases bone loss.

Cancer and Your Bones

- Have provided education to support groups for breast and prostate cancer.
- Provide seminars to healthcare providers.
- Distribute fact sheets through cancer treatment centers and through New York State Cancer Services Program.

Professional Education:

- Train the trainer programs- help to increase knowledge when funds or resources are limited.
- CME credits are often available.
- Pursuing the use of Webinars for greater geographic spread.

Professional Education:

- State and County DOH educators
- NYSOFA staff and caregivers
- Students in schools of nursing and public health
- School nurses
- Nurse Practitioners
- Registered Dietitians/Nutritionists
- Physical Therapists
- Exercise Professionals
- Medical professionals in hospitals and private practices
- Pharmacists
- Assisted Living Healthcare Providers
- Dentists
Bone Health Education for Nursing Students

2-hour interactive PowerPoint presentation instructs on prevention and treatment of osteoporosis through discussions of:

- What is osteoporosis?
- Common risk factors and prevalence
- Bone mineral density testing
- Actions for stronger bones
  - Such as nutrition, exercise, and lifestyle
- Fall Prevention
- Treatment options
- Local support services
  - Osteoporosis support groups
  - Fall prevention programs
  - Smoking cessation programs
  - Walking and exercise opportunities
- Advances in research

Today’s Program Taught Me:

- What is osteoporosis?
- General risk factors of osteoporosis
- What is a t-score?
- What are the medications for osteoporosis

Today’s Program Will Help Me:

- Daily adequate intake for calcium
- How to read a food label
- Vitamin D intake recommendations
- Steps to prevent falls
- Start or increase participation in weight-bearing exercise
- Get enough calcium and Vitamin D
- Speak to my healthcare provider about my bone health
- Modify home environment to prevent falls

Today’s Program Taught Me:

- Falls Prevention
- Osteoporosis treatment options
- Osteoporosis support groups
- Smoking cessation programs
- Falling prevention programs
- Osteoporosis support groups

Today’s Program Will Help Me:

- Very Helpful
- Helpful
- Other

Communio Education

Our public health partners make a difference for individuals starting at birth and continuing throughout life…

www.NYSOPEP.org

NYSOPEP Website Data During 2012-2013

<p>| | |</p>
<table>
<thead>
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</tr>
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<tbody>
<tr>
<td>Average Daily Hits</td>
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<tr>
<td>Average Daily Visits</td>
<td>300</td>
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<tr>
<td>Average Daily Page Views</td>
<td>481</td>
</tr>
<tr>
<td>Average Fact Sheet Downloads Per Month</td>
<td>239</td>
</tr>
</tbody>
</table>
Risk Factors that Can be Changed:
Focus of Community Education

- Low lifetime calcium and/or vitamin D intake
- Lifetime lack of exercise
- Smoking
- Excessive alcohol use
- Underweight for height (low body mass index) if caused by unhealthy diet or excessive exercise, rapid weight loss

Bone Health for Infants

It is never too early to think about bone health.

- Pregnant women need sufficient calcium to avoid personal bone loss to meet the demands of the fetus (WIC food benefits)
- Pregnant teens are at the greatest risk of bone loss
- Breast fed infants need to have vitamin D supplementation

Bone Health for Children

Encourage healthy bone-building habits:

- Choose a healthy plate with plenty of fruits and vegetables
- Consume adequate calcium from food
  - Include low-fat/fat free dairy foods or calcium rich foods/beverages with each meal
- Supplement with Vitamin D
- Get regular physical activity

These bone healthy behaviors will also help fight obesity and have been the prime components of NY State Eat Well-Play Hard Steps to a Healthier NY Programs

Bone Health for Adolescents

At risk due to rapid growth:

- Calcium (1300 mg)
- Vitamin D (800 IU)
- 60 minutes of physical activity

Avoid risky behaviors:

- Eating disorders
- Over-exercising
- Peer influence: smoking, alcohol, anabolic steroids

Strong Bones for You and Your Baby:
Specific to the General Public and WIC

- WIC collaboration
  - Fact sheet
  - Webinar on bone health
- Elaine R. Zervos/BNNR/DN/CCH/OP H/DOH
  - Fact sheet

Eat Well-Play Hard, NYSOPEP Collaboration:

- Awareness message printed on milk cartons
- “Choose 1% or less” decal created for and placed on milk display cases
The Female Athletic Triad
Disordered Eating/Over-training

Amenorrhea Osteoporosis

School Based Education
An adjuvant to the New York State Middle School Skeletal Science Curriculum
- Bone health education program for students between 5th and 8th grade
- Teaches students how to promote strong bones through a didactic education seminar
- The main outcome measurement is the amount of bone health knowledge and understanding

Educational Course
The lesson plan focuses on strategies promoting strong bones such as:
- Eating a varied, nutrient-dense diet
  - Following the USDA guidelines
  - Eating fruits, vegetables, and calcium-rich foods
- Consuming the recommended calcium and Vitamin D
- Avoiding unhealthy/risky behaviors including:
  - Alcohol consumption
  - Smoking
  - Excessive dieting and thinness
- Participating in regular daily physical activity
- Using bone protective safety equipment

Findings
- Found a significant association between average percent change for every grade level analyzed.
- 5th grader’s scores suggest that they had the largest change in knowledge.
- 7th grade posttest scores may indicate they had the greatest understanding of the material after the course.

Table I. Knowledge Change: Stratified by Grade Level

<table>
<thead>
<tr>
<th>Grade Level</th>
<th>n</th>
<th>Average Change (%)</th>
<th>Average Pretest (%)</th>
<th>Average Posttest (%)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>932</td>
<td>37</td>
<td>52</td>
<td>89</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>5th Grade</td>
<td>403</td>
<td>41</td>
<td>47</td>
<td>89</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>6th Grade</td>
<td>216</td>
<td>30</td>
<td>56</td>
<td>87</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>7th Grade</td>
<td>191</td>
<td>35</td>
<td>60</td>
<td>94</td>
<td>&lt; 0.0001</td>
</tr>
</tbody>
</table>

Build a Bone Healthy Plate
- Eat the right amount of calories for a healthy weight
- Eat more:
  - Vegetables and fruit- ½ of your plate
  - Whole grains- ¼ of your plate
  - Fat free or low-fat (1% fat) milk or dairy products (or other calcium rich food) at each meal
  - Lean protein (meat, poultry, fish, eggs, beans, peas, soy products, nuts and/or seeds) at meals, portion size deck of cards
Recommended Daily Calcium Intake
(Institute of Medicine, 2010)

<table>
<thead>
<tr>
<th>AGE</th>
<th>Calcium/day in milligrams</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-3</td>
<td>700</td>
</tr>
<tr>
<td>4-8</td>
<td>1000</td>
</tr>
<tr>
<td>9-18</td>
<td>1300</td>
</tr>
<tr>
<td>Men 19 – 70</td>
<td>1000</td>
</tr>
<tr>
<td>Women 19 - 50</td>
<td>1000</td>
</tr>
<tr>
<td>Women 51- 70</td>
<td>1200</td>
</tr>
<tr>
<td>Men and Women 71+</td>
<td>1200</td>
</tr>
</tbody>
</table>

TUL for men and women age 51+ is 2000 mg

Common Misinterpretation from Too Little Information

The Information:
“You need 1200 mg of calcium And 800 IU of vitamin D.”

Typical Action>

Estimate Calcium Intake

<table>
<thead>
<tr>
<th>Food</th>
<th>Servings per day</th>
<th>x Calcium (mg/serve)</th>
<th>Calcium (mg per day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk</td>
<td>300</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yogurt</td>
<td>200 - 350</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cheese/mixed cheese</td>
<td>200</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calcium fortified foods</td>
<td>100 to 1000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calcium from other foods</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Calcium from other foods: 250 mg is the typical calcium intake from other foods with smaller amounts of calcium per serving. + 250 mg Estimated Daily Calcium in the Foods You Eat = (Add all the Above) = _____ mg

Dairy Foods: An Easy Way to Get Calcium

Low dairy intake associated with low calcium and Vit D intake

Top 10 Calcium Rich Green Leafy Veggies (mg calcium per cooked cup from high to low)

- Collards-360
- Turnip greens-250
- Broccoli rabe- 220
- Kale-180
- Bok choy-160
- Dandelion greens-120
- Okra-120
- Mustard greens-100
- Broccoli spears-90
- Snow peas-70

Meal Makeover Small Changes Make a Difference

THE BODY USES CALCIUM BEST IN AMOUNTS of 600 mg or less at a time

Breakfast (before)

<table>
<thead>
<tr>
<th></th>
<th>(mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 cup cornflakes</td>
<td>100</td>
</tr>
<tr>
<td>½ cup OJ</td>
<td>75</td>
</tr>
</tbody>
</table>

Breakfast (after)

<table>
<thead>
<tr>
<th></th>
<th>(mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 cup cornflakes</td>
<td>100</td>
</tr>
<tr>
<td>½ cup Milk</td>
<td>150</td>
</tr>
<tr>
<td>½ cup OJ</td>
<td>75</td>
</tr>
</tbody>
</table>

250 mg
**Fact: More Calcium is Not Better**

- It is important to consume the recommended amount of calcium, preferably from food.
- More calcium is not better; excess calcium intake particularly from supplements, consumed on a regular basis may be harmful.
- Tolerable upper limit for calcium was lowered to 2000 mg a day, aim for target of 1200 mg a day from food and supplements if needed.

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**Vitamin D is Key for Healthy Bones**

- A fat-soluble vitamin that can be stored in the body for later use.
- Need enough each day but does not have to be consumed along with calcium.
- Helps the body use (absorb) calcium.
- May increase muscle strength to reduce falls in older adults.
- May help protect against other chronic diseases.

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**Recommended Dietary Allowances* (regardless of sun exposure)**

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Vitamin D (IU*daily)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age 1 to 70</td>
<td>600 IU</td>
</tr>
<tr>
<td>Age 71 or older</td>
<td>800 IU</td>
</tr>
</tbody>
</table>

- Healthcare provider may recommend more if individuals are at risk for low vitamin D levels or have certain medical conditions including osteoporosis (NOF recommends 400 to 800 IU for adults age 19 to 50 and 1000 IU for adults age 51 and over).
- Higher intakes of vitamin D may be recommended to adults for other health benefits.

*National Institute of Medicine, 2010

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**Vitamin D Sources**

- Sunlight- not reliable (Follow skin protection guidelines)
- Diet- minor
  - Natural Sources
  - Fortified sources
- Supplements readily available, inexpensive, needed by all breastfed infants, many children and adults, most older adults.

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**Natural Sources of Vitamin D**

- High Vitamin D (400 IU or more in a 3 ounce serving or in a tsp oil)
  - Eel
  - Trout
  - Swordfish
  - Catfish
  - Mackerel
  - Shiitake mushrooms, sun-dried
- Cod liver oil (but not recommended as source of vitamin D)
- Moderate Vitamin D (100 IU to 300 IU in a 3 ounce serving)
  - Salmon
  - Tuna (light)
  - Halibut
  - Sardines
  - Flounder or Sole
- Some Vitamin D (Less than 100 IU in a serving)
  - Tuna (3 ounces white or yellowfin)
  - Egg (1 egg eaten with yolk)
  - Shiitake Mushrooms (per cup)

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**Beverages Fortified with Low Amounts of Vitamin D**

- 100 IU in 8 ounces
Be Mindful Portions

- ½ of plate: fruit & vegetables
- ¼ plate: lean protein (size of deck of cards)
- ¼ plate: whole grains
- Dairy or fortified soy beverage

Eating the Nutrient Rich Way is Bone Healthy

For most healthy individuals, the other nutrient you need for strong bones (such as magnesium, potassium, vitamin C, and vitamin K) can be easily met by:

- eating a nutrient-rich varied diet
- eating more fruits and vegetables
- following the recommendations of USDA My Plate

Keeping Your Bones and Teeth Strong For Life:

- Collaboration with Bureau of Dental Health, New York State Department of Health
- Article in New York State Dental Journal June/July 2012 “Osteoporosis” for professional education
- Combined efforts on a fact sheet for community education

Smoking and Bone Health

Physical Activity has the potential to:

- Increase bone density in youth and young adulthood
- Maintain and may modestly increase bone density in adulthood
- Prevent and minimize kyphosis
- Increase muscle mass
- Improve balance and agility
- Reduce the risk for fall-related fractures

Global Recommendations: Physical Activity in Middle-aged and Older Adults (50+ years of age)

- Balance training for falls prevention
- Strength training 2 to 3 times per week
- Weight bearing exercises such as walking
- 30 minutes or more of moderate physical activity on most, preferably all, days of the week
Ideal Physical Activity Combines:

- **Weight-bearing** - any physical activity in which your body works against gravity
- **Muscle strengthening** - builds muscle that helps support and strengthen your bones
- **Postural training** - includes stretching and strengthening to promote correct posture and proper body alignment
- **Balance exercises/activities** - may help reduce your risk of falling

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How are Falls and Osteoporosis Linked?

- Falling is the most common cause of fractures, 1 in 10 falls end up in serious injury such as broken bones
- 90 to 95% of hip fractures are the result of a fall
- Regular physical activity and exercise can reduce the risk of falls and improve your bone health.
- Vitamin D deficiency is a risk factor for both falls and broken bones

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Safety Strategies for Fall Prevention

- Home safety inspections
- Regular vision and hearing exams
- Know the side effects of medications
- Promote safety precautions in inclement weather
- Promote the use of assistive devices as needed
- Advise limited alcohol consumption
- Teach proper body mechanics and principles of safe movement

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New York State Office for Aging

New York State Office for Aging
Senior Site Directors: >2000 English and 300 Spanish meal cards have been distributed

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Community Education

- Support Groups
- Worksite Wellness
- Senior Programs and Services
- Public and Private Organizations
- Faith-based Organizations
- Schools and Youth Organizations
- NYSOPEP Website
Program Evaluation

- Questionnaires distributed upon completion of seminar.
- Questions assessed the efficacy of the seminar in promoting participant understanding of various concepts.
- A 6 month follow-up questionnaire determined if participation in the seminar helped modify behaviors such as:
  - Starting or increasing weight-bearing exercise
  - Speaking to a healthcare provider about bone health
  - Reducing fall risks inside and outside the home

Today's Program Taught Me:

- % Very Helpful
- % Helpful
- % Other

Today's Program Will Help Me:

- % Very Helpful
- % Helpful
- % Other

Today's Program Has Helped Me:

- % Very Helpful
- % Helpful
- % Other

I participated in the BHS, and six months after program it helped me:

- % Very Helpful
- % Helpful
- % Other
I participated in the BHS, and six months after program it helped me:

- % Very Helpful
- % Helpful
- % Other

Hip Fracture Liaison: Objectives
- Determine the current status of osteoporosis diagnosis and treatment of adult patients with hip fractures at HHH using historical controls.
- Does a fracture liaison service (NP) improve osteoporosis specific measures?
- The fracture liaison service includes:
  - NP inpatient consult
  - Outpatient visits for evaluation and treatment of osteoporosis or referral to the patient’s PCP with letter from NP
- Will the initiation of this service change the decision to initiate pharmacologic treatment for osteoporosis or to begin other preventive measures (including BMD test)?

Methods
- First consultation includes: a description of osteoporosis unit affiliation and why the consult was ordered.
- Inform the patient that all adults over age 50 with a non-traumatic hip fracture would be defined as having osteoporosis.
- Confirm and elaborate on past medical, surgical and medication history as well as any prior fractures.

Preliminary Results: After Fracture Liaison Implementation

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Control Group (n=60)</th>
<th>Fracture Liaison Group (n=75)</th>
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<tbody>
<tr>
<td>Told that hip fracture=OP</td>
<td>50%</td>
<td>54%</td>
</tr>
<tr>
<td>Told about calcium</td>
<td>57%</td>
<td>63%</td>
</tr>
<tr>
<td>Recommendation made</td>
<td>20/60=33%</td>
<td>42/75=56%</td>
</tr>
<tr>
<td>Followed +/- calcium</td>
<td>16/20=80%</td>
<td>28/30=93%</td>
</tr>
<tr>
<td>Told about Vitamin D</td>
<td>9%</td>
<td>11%</td>
</tr>
<tr>
<td>Increased intake of Vitamin D</td>
<td>37%</td>
<td>78%</td>
</tr>
<tr>
<td>Told to get BMD</td>
<td>35%</td>
<td>66%</td>
</tr>
</tbody>
</table>

Conclusion
- Bone Health is critically important at all ages
- We need people to understand the simple actions that can be taken to promote bone health
- Through our partners, that share risk factors or share behaviors to promote: We can make a difference.

For more information:

www.NYSOPEP.org