

Bone Health SIG Update from ISO 2015: National Osteoporosis Foundation:
Interdisciplinary Symposium on Osteoporosis-Washington, DC
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BHSIG Chair



(Pictured above: Kathy Shipp, PT, PhD, GCS, Debbie Rose, PhD, Wendy Katzman, PT, DScPT, Karen Kemmis, PT, DPT, Sherri Betz, PT, GCS, PMA®-CPT, and Beatrice)

The NOF-ISO 2015 had a very different feel from past conferences. There was much more direction towards a patient centric healthcare model and emphasis on physical activity, fracture prevention and balance and fall risk assessment. Physicians dealt with controversial bone health topics head on. Mary Oates, MD, Physical Medicine and Rehabilitation specialist, co-chair of the Conference Planning Committee, was a strong advocate of physical activity and wanted exercise and safe movement to take a larger role in the conference. Every presentation was compelling, thought-provoking, and informative. In several talks, we saw a move toward the “clinical diagnosis of osteoporosis” that is not solely based on the T-score.

Ellen Burstin, MD, gave the keynote address with a discussion of some compelling changes in our healthcare paradigm: “We will shift to value and pay for performance. The concept of value is here to stay. Process measures are less important for accountability. There is a greater focus on improving outcomes; especially patient reported outcomes.”

“Coordination and communication are vitally important for patient care! We must be able to measure our outcomes. We want measures that reflect optimal performance! Patient reported outcomes are increasingly important and will be tied to payment. Appropriateness and overuse will be tracked. For example, how often should we repeat vitamin D tests and/or BMD tests? There is an emerging focus on how we can improve care in our communities,” according to Dr. Burstin.

Fracture Liaison Service: Mary Oates, David Lee, Andrea Singer, Tom Olingenski

The brainchild of the NBHA (National Bone Health Alliance), Fracture Liaison Service (FLS) <http://www.nbha.org/fpc> program is growing by leaps and bounds. Many hospitals and outpatient clinics across the country are adopting this program with an emphasis on the treatment and assessment of any patient who presents with a fracture. NBHA has initiated the *2Million2Many* initiative to increase awareness about bone health and fracture prevention. Find out more about this initiative at: <http://www.nbha.org/>



CONCLUSIONS: National Bone Health Alliance WORKING GROUP

The diagnosis of osteoporosis should be made in postmenopausal women and men age 50 or older if any one of the following is present:

1. T-score lower than or equal to -2.5 at the spine or hip
2. Low trauma hip fracture, with or without BMD
3. Low trauma vertebral, proximal humerus, pelvis, or some distal forearm fractures in the setting of osteopenia
4. FRAX score in a patient with osteopenia meeting or exceeding the NOF Guide treatment cut points

Note: When calculating the Bone Mineral Density score in the spine, you can delete the high BMD score of a lumbar vertebrae that has unusually high BMD due to DDD, or previous compression fracture.

Find more information at <http://www.nbha.org/groups>

Vertebral Fracture Assessment and Recognition-Special Course: Susan Broy, MD and Tamara Vokes, MD

Vertebral Fracture Assessment is taking a much bigger place in the arena of assessment and treatment of vertebral fracture. Dr. Susan Broy and Dr. Tamara Vokes taught a pre-conference interactive workshop on recognizing and categorizing vertebral fracture. We learned that T12 is actually the most popular fracture site, followed by T6, T7 and T8. There are 3 levels of wedge fractures and 3 levels of crush fractures as measured by anterior, middle and posterior vertebral height. They stated that there is often natural wedging without fracture at the T7 region without fracture that occurs with aging.

Susan Bukata, MD, gave a great presentation on Geriatric Fracture Programs and Fracture Liaison Services with a fascinating style of relaying statistics. She made

statistics exciting! She reported “If you have a fragility fracture, your risk of hip fracture doubles. If you have a vertebral fracture, your risk of hip fracture increases 5-fold and the 2nd fracture usually happens within one year.”

She also clarified, “A fall from standing height or less that results in a broken bone is a fragility fracture! You don’t need a DEXA to determine that you have osteoporosis if you have had a low energy fracture!”

“When young people get fragility fractures, this indicates that they have poor bone quality,” she claimed.

She made us laugh with, “If we knew what rock to lick, we would!” When her patients say, “I just want to treat this the natural way.” Bukata’s response, “Break your hip and die?”

She reported that .01 in 100,000 are the risks of Osteonecrosis of the Jaw and Atypical Subtrochanteric fractures of the femur. She wanted us to “Borrow, Steal Copy FLS Programs” and get them started in our communities! Preventing hip fractures saves dollars and gives us the most bang for our buck in healthcare savings!

Dr. Susan Bukata fielded some interesting questions from the floor:

1. Do the current medications interfere with fracture healing? “None of the current meds, except IV Bisphosphonates, interfere with fracture healing since they don’t affect early callous formation in acute fractures. Don’t give osteoporosis medications during the first 2 weeks post-acute fracture. But don’t wait too long to administer an osteoporosis medication. People start to forget the pain of the fracture and might be more likely to avoid taking osteoporosis medications.”

2. What is the recommendation for men for DXA screening? “Men over age 70. Height loss can help us identify more men at risk. We can also use height loss as a code for reimbursement to justify treatment. We need a screening code for men. There is a DXA legislation bill now on Capitol Hill for increasing reimbursement.”

3. Often DXA Scores are skewed in patients with degenerative disc disease. I have often seen great DXA scores and after Vertebral Fracture Assessment we see 3-4 compression fractures. How do we deal with this? “The osteophytic changes often cause an apparent increase in BMD. However, DDD increases the risk for fracture due to the decrease in shock absorption at the vertebral segments,” answered by Susan Broy.

Robert Recker, MD, gave the **Lawrence Raiez Lecture** and let us know that the 2004 Surgeon General’s Report was largely written by Dr. Raiez. Dr. Raiez developed the Bone Coalition to provide a call to action for Americans to take responsibility for the prevention bone loss with aging. In 1947, Fuller Albright defined osteoporosis as attributed to the decrease in estrogen production.

Dr. Recker discussed some of the actions of current and new medications. The anabolic effect of parathyroid hormone increases connectivity of trabeculae. Bone must be mineralized to promote bone formation. Blososomab is in the late stages of development. This sclerostin antibody drug will be produced by Lilly within the next 1-2 years.

In discussion of the controversial atypical Femur Fracture (AFF) topic, Dr. Recker stated that he has seen more AFF in pts who have NEVER taken bisphosphonates. He has also performed biopsies on patients who were on bisphosphonates for 10 years. He surprisingly stated, "We started seeing more AFF when oncologists started giving megadoses of bisphosphonates to cancer patients!"

Dr. Recker answered the question, "Is long-term use of bisphosphonates doing bad things to structural properties of bone?" He replied, "Biopsies show that patients on bisphosphonates have 50-60 nuclei in their osteoclasts. Bisphosphonates accumulate in your skeleton as long as you take them. It takes several months to one year to see change in markers after discontinuation of bisphosphonates."

Ethel Siris, MD: The Clinical Diagnosis of Osteoporosis

"Most fractures in postmenopausal women occur in those whose T-scores are better than -2.5 largely because most of the population at risk have a BMD diagnosis of osteopenia, not osteoporosis," according to Dr. Siris.

Dr. Siris stated, "When a patient breaks a bone, they say, it was so stupid, I never should have fallen!" She reported in the Horizon Trial, 41% of Hip fracture subjects had greater than a -2.5 T-score."

Diagnosing those at elevated risk fracture risk by several different criteria, not solely by T-score \leq -2.5, should help to raise awareness and hopefully improve anti-fracture management," she claimed.

Mary Oates, MD: Office-Based Balance and Fall Risk for physicians

Dr. Oates advocates in-office testing of patient's balance and fall risk. She watches her patients walk and navigate around the office and documents their gait disturbances. The DXA Technologist also documents wobbliness or unsteady gait and unsteady transfers to DXA machine.

She reports that her patients tell her, "I would rather die than go to a nursing home." "Now, more patients are staying at home by themselves which places them at increased risk for falls. Physical therapists need to be your best friend! Fear of falling promotes fearful behavior and leads to more immobility, deconditioning and ironically, more falls. We need to get them started on good exercise programs as soon as possible."

“95% of hip fractures are caused by falls, as stated by Siris. We need ongoing exercise programs for older adults at risk for falls. Oates considers that proximal humerus fractures are major osteoporotic fractures.” Oates also stated that you can use DXA machines to look at lean body mass and detect sarcopenia which increases fall risk. AAA will provide grab bars and home modifications if these are needed for fall prevention. She recommended the 10 Foot version of the Timed Up and Go (TUG) test as an easy in-office assessment tool for fall risk assessment. She also advocated the 30-second chair stand test.



Lilly)

Modifiable Fall Risk Factors:

1. LE weakness
2. Difficulty with gait/balance
3. Psychoactive medication
4. Postural hypotension/dizziness
5. Poor vision
6. Issues with feet or shoes (peripheral neuropathy)
7. Home hazards (she uses hazard lists from Lilly)
8. Animals (tripping over them on the floor or leashes)

Dr. Oates stated that, “An older adult who cannot hold a tandem stance for 10 seconds is at increased risk for falls.”

“Exercise is medicine!” concluded Dr. Oates.

Michael Lewicki, MD and Robert Adler, MD, spoke about Truths and Myths of Medication Therapy for Osteoporosis:

Myth #1: Osteoporosis drugs don’t work after 5 years. “We really don’t know since we have no data beyond 10 years,” according to Dr. Lewicki.

Myth #2: FDA recommends stopping bisphosphonates after 5 years of therapy. T or F?

Lewicki’s response: “Osteoporosis drugs stop working as soon as patients stop taking them. (except bisphosphonates) There is limited data on duration of anti-fracture effect after stopping osteoporosis meds. The lumbar spine BMD slowly decreases after stopping alendronate. All Bisphosphonates are not the same. ½-1% is actually absorbed. 50% attaches to bone. 50% is excreted from kidneys unmetabolized. A drug holiday is recommended after 3-5 years. There is no real standard of care and there are many opinions. We are often stopping treatment when it should not have been started in the first place.”

Teriparatide (Prolia) is limited to 2 years in a lifetime. (it was shown to increase the incidence of osteosarcoma in rats) Long-term studies in humans were terminated at

2 years due to the strong link to developing osteosarcomas in longer-term trials in rats.

Atypical Femur Fractures:

Dr. Rick Dell from Kaiser led a study of 1.8 million patients identified with femur fractures from January 1, 2007 until December 31, 2011 in patients older than 45 years who were enrolled in the Healthy Bones Program at Kaiser Southern California, an integrated health care provider. Of the 142 patients that had atypical fractures; of these, 128 had bisphosphonate exposure. There was no significant correlation between duration of use and age or bone density and AFF. Patients at risk for osteoporotic fractures should not be discouraged from initiating bisphosphonates, because clinical trials have documented that these medicines can substantially reduce the incidence of typical hip fractures.

Dr. Lewicki spoke about the Atypical Femur Fractures in Men study published by Safford in 2014, which was an observational study in the VA system. This retrospective cohort study was conducted using 1998-2007 Veterans Health Administration electronic medical records data on 78,155 individuals who had a fragility fracture at age 45 years or older. The cohort had a mean age 66.5 years at the time of their first fracture, and most were observed for 6 or more years; only 11.8% were prescribed bisphosphonates during observation. Nontraumatic subtrochanteric femoral fractures were uncommon, and longer bisphosphonate use was associated with lower (not higher) risk of NTST femoral fractures.

Bisphosphonate Induced Osteonecrosis of the Jaw

Dr. Adler referred to Dr. Joan Lo's paper regarding the prevalence of osteonecrosis of the jaw in patients with oral bisphosphonate exposure where 1/952 patients treated with oral bisphosphonates presented with ONJ.

Vertebral Fracture

Adler also mentioned that vertebral fractures and kyphosis coupled with COPD can stress the heart even further than with COPD alone..

Connie Weaver, PhD, and Joan Lappe, PhD: Achieving Peak Bone Mass in Childhood

Dr. Weaver reported that there is strong evidence in the literature that dairy and calcium intake and physical activity have positive effects on children in reaching high peak bone mass. There are some well-designed randomized controlled trials on vitamin D in children with varied conclusions. There are limited studies on fat and protein in children. Vitamin D studies contain 7 RCT's that report varied conclusions. The 2008 Physical Activity Guidelines for Americans recommend \geq 60 minutes daily moderate to vigorous intensity (including muscle and bone strengthening of unspecified type, dose, duration). In regard to nutrition research it is becoming more in vogue to look at nutrient patterns and how individual nutrients interact with each other.

Weaver challenged research questions related to physical activity and bone health in children and adolescents. “Surprisingly, we only know the relationship of jumping to bone. There are no other studies on any other type of exercise and bone in children,” she stated.

Jumping Studies in Children:

- Fuchs, et al published a study in 2001 at the Oregon State Bone Research Laboratory that gave us a good jumping picture with positive effects on BMD in children who jumped 100x off 24 inch high boxes three times weekly for 7 months as compared to children who performed non-impact stretching exercises.



- In 2005, McKay, et al published a study including 51 children, mean age 10.1 years, participated in “Bounce at the Bell” which consisted of 10 counter-movement jumps (two foot take off, clutch knees, two foot landing) 3 times per day at school. Controls were 71 matched children who followed usual school practice. Dietary calcium, physical activity, physical performance, and anthropometry was assessed in September and after 8 months of intervention (June). Intervention children gained significantly more BMC at the total proximal femur (2%) and the intertrochanteric region (27%).

There has been no research on physical activity in ethnic groups and how they respond to exercise. Camp Calcium was a study of controlled diets looking mainly at calcium. They found that if children achieved 1300 mg per day they deposited 4% more skeletal mass. Boys are more efficient at calcium absorption. Blacks are more efficient at calcium absorption than whites by 42% with same calcium intake. The optimal calcium intake is 1300mg/day.

Joan Lappe, PhD: Challenges and Strategies for Achieving Peak Bone Mass in Childhood

The BMD peak is reached at most sites by age 25. The spine accrues a bit more bone after age 25. Bone modeling continues until epiphyses fuse. It is very difficult to increase bone mass in adults. In grades 7-9 less than 60% of kids are getting the physical activity they need. In grades 10-12 the level of physical activity drops to less than 30%! Kids form their lifelong habits by around age 10.

“If a child is sedentary during growth years, the skeleton senses that you don’t need a very strong skeleton to support your activity!” according to Lappe.

In the Iowa Bone Development Study, starting at age 5 and continuing at 8, 11, 13, 15 and 17 years, 530 children participated in a prospective cohort study wearing an

accelerometer for 3-5 days. Girls and boys who accumulated the most MVPA had greater bone mass and better geometry at 17 years when compared to less active peers. The proportion of participants achieving high levels of moderate-and-vigorous intensity physical activity (MVPA) throughout childhood was very low (<6% in girls) and by late adolescence almost all girls were inactive.

According to Dr. Lappe, at birth the human skeleton contains only about 2-3% of the total adult body calcium. Age 9 is a critical point in bone development. Children should get about 1300mg/day of calcium. Only 15% of girls are getting adequate intake at age 9 and at age 12 only 10% of girls have adequate calcium intake.

Lappe's 2008 Navy study looked at 5210 female recruits at a mean age of 19 in college and high school for the prevalence of stress fractures. The athletes performed 1 hour of physical activity everyday such as calisthenics, push up and walking without backpacks or marching as in boot camp. By supplementing with calcium for 7 weeks during their training they saw a 20% decrease in fracture incidence in the training group versus the controls.

Vitamin D enhances renal retention of calcium and stimulates osteoblast formation and function. Humans need to at least drink 6 glasses of milk to get 600 IU/day. Ocean raised salmon is also rich in vitamin D. There are no studies in children to determine proper sun exposure to achieve optimal levels of vitamin D.

"Children spend 50% of their time in school. Physical education classes are cut due to cost constraints. Instead of having recess in large cities they just let the children out of school early. Many children are now using smart phones and tablets that decrease physical activity," according to Lappe.

Andrea Singer, MD: Controversies of Calcium Supplementation and Risk of Myocardial Infarction

Dr. Singer summarized five studies showing that calcium supplementation was associated with 31% increase in myocardial infarction (MI) that also showed that there was no increase in risk of stroke, death or sudden death. There is a paucity of consistent evidence on the relationship of calcium to MI. However, the Women's Health Initiative Trial of 36,282 subjects showed no apparent risk of MI, CHD, CVD, overall cardiovascular disease or total mortality. Four important abstracts from American Society of Bone and Mineral Research (ASBMR) 2013 found no significant effect of calcium supplementation on risk of CVD. The Osteoporotic Fractures in Men (MrOs) Study of 5967 men over age 65 found that total calcium intake, use of calcium supplements and the combination of high dietary calcium intake and supplemental calcium were not associated with cardiovascular mortality. Ironically, the highest mortality for CVD was seen in the quartile with the lowest intake from calcium supplementation. In NHANES III, 20,024 subjects showed that dietary calcium intake and calcium supplementation were not associated with an increased risk of cardiovascular death. Heaney performed a systematic review in 2012 of several well-designed RCT's and found that there was no difference in hospital

cardiac events, death rates, CHD, total mortality, CV events and death related to calcium supplementation in the 8 trials compared. Heaney also found in the 2012 systematic review of 16 observational studies that there was no relationship to calcium supplementation and risk of cardiovascular disease.

Dr. Singer stated, “True placebo-controlled randomization in a trial of a single, readily available nutrient such as calcium is difficult to achieve. Since food trumps supplements, use calcium supplements only to add to what you are not getting from food. Calcium and vitamin D are vital for bone health and muscle function. If there is any association between calcium and MI it seems to be at higher levels of calcium supplementation beyond the recommended norms.”

Sarah Morgan, MD, MS, RD, CCD: Confusion around Vitamin D

Dr. Morgan stated that there is no congruence in the recommendations for serum vitamin D levels and that vitamin D supplements vary in potency. Individuals with vitamin D deficiency have poor calcium absorption. There is an improvement in absorption at 30-35ng/ml of 25-OH vitamin D blood levels. She recommends following the “goldilocks” principle; not too much, not too little, just right!

Dr. Morgan recommended:

- Optimal 40-50ng/ml of 25-OH vit D level
- Anywhere from 1200-2000IU of vit D every day

“For each 1ng/ml increase needed, a patient must increase their vit D supplement by 100 I.U. per day. A patient with a starting value of 15ng/ml requires at least 1500IU/d to bring blood levels up to 30ng./ml,” Morgan advised.

Surprisingly, Dr. Morgan stated that there is not overwhelming evidence about magnesium’s effect on bone. She recommends adding magnesium to combat constipation.

What about megadose vitamin D treatments? Are they safe? Dr. Morgan stated that vit D2 is only available in high doses of 50,000IU in her formulary or in special formularies. When her patients tend to drop on lower daily doses she puts them on this megadose treatment.

With patients at risk for kidney stones, dietary supplements are preferred. She recommends supplementing with calcium citrate in evening and avoiding exceeding guidelines. If in question, she monitors 24-hour urine calcium levels. If urine calcium levels are high she is hesitant about supplementation.

Dr. Morgan is the director of the University of Alabama Osteoporosis Prevention and Treatment Clinic. See their website, <http://www.uab.edu/shp/toneyourbones/> containing lots of resources for the consumer.

John Schousboe, MD and Suzanne Cadarette, PhD:

Challenges to Medication Therapy: Promoting Adherence and Persistence.

It appears that the medical community is taking heed of the consumer's resistance to taking medications for osteoporosis. Dr. Shousboe stated that,

“If the patient doesn't want to take the medication, we want to honor that.”

Physicians should establish and maintain trust, open communication, discovery of patients preferred decision-making process, and identify and address medication concerns as well as education on fracture risks and concerns to promote adherence. He advocates showing them their own vertebral compression fractures on X-ray or VFA and illustrate the risks of subsequent fractures. If patients choose not to take medication be sure to follow up anyway...they may change their minds.

Wendy Katzman, PT, DPTSc, OCS: Exercise Recommendations to Reduce Vertebral Fracture Risk

Dr. Katzman gave us an excellent overview of the effects and causes of vertebral fractures including the relationship of neuromuscular control, spinal load and kyphosis effects. Having one vertebral fracture increases the risk of another vertebral fracture by 20% within one year and a 4-fold increase of future lifetime fracture, as well as increasing the risk for other fractures, independent of BMD! Vertebral fractures are found in about 1/3 of those with hyperkyphosis. An estimated 2/3 to 3/4 of vertebral fractures are undiagnosed.

The Rancho Bernardo study investigated hyperkyphosis in 596 community-dwelling women age 47-92 years and found that greater kyphosis increased fracture risk by about 75%. The Study of Osteoporotic Fractures conducted over 15 years investigated 994 community-dwelling women found that greater kyphosis increased non-spine fracture risk by 31%. There have been several studies that have found that hyperkyphosis is a risk factor for falls, including injurious falls.

Dr. Katzman's research showed that increasing kyphosis was predictor for poor performance on the Timed Up and Go test. Higher kyphosis increases compression and shear in the vertebral bodies according to Briggs 2007 study. Iyer, 2010, compared five different tasks (Standing, Standing holding 10kg in both hands, Standing holding 10kg weights with the elbows bent, Forward flexion with 10kg weight in front of body, Standing in 15 degrees of extension. This study, not surprisingly, showed that compressive force in the vertebrae is highest in forward flexion of the spine. Myers, 1997 comparison of compressive forces on L3 during common daily tasks at various levels of BMD showed that bone fails at lower BMD and higher loads. McIntyre, et al, developed the Safe Functional Motion Test for movement strategies that help to predict fracture. They found that superior movement strategies reduced the risk of vertebral fractures.

Dr. Katzman suggested that targeted exercise can minimize loss of load in the spine. High load resistance training, mixed loading, and odd-impact loading all have a positive impact on slowing the loss of bone and reducing fracture risk. There is good evidence that multi-component exercise, Tai Chi, and individually tailored exercise can decrease the risk of falls and subsequent fractures by 22-37%.

Dr. Katzman reviewed several studies by Sinaki involving thoracic extension strengthening exercises and reductions in risk of future fractures. Bennell, 2010, treated subjects with manual therapy, taping and therapeutic exercise in 20 subjects with painful vertebral compression fractures which resulted in decreased pain and increased physical function. There was no change in kyphosis with the interventions. Gold and Shipp treated 185 postmenopausal women with 6 months of exercise and coping classes which resulted in increased extensor muscle strength and improved psychological status but no change in pain. Dusdal performed a systematic review of 9 studies finding that prone extension exercises are safe and effective for those with osteoporosis and vertebral compression fracture.

Giangregorio performed a systematic review of 7 studies in 2013 and found that studies reported benefits of decreased pain, increased function and quality of life outcomes and most importantly recommended that exercise, if not done correctly, could increase the risk of fracture. In Bansal and Katzman's systematic review of exercise for improving age-related hyperkyphotic posture, 8 of the 13 studies reviewed reported improvements in one or more measures of kyphosis and 4 of the highest quality studies reported the benefits of manual therapy and/or low-intensity exercise on reduction of kyphosis.

Katzman state, "we can expect to slow vertebral body bone loss, reduce falls, reduce the load, improve spinal extensor muscle strength, reduce hyperkyphosis, reduce pain, and improve physical function after vertebral fracture."

Dr. Katzman also recommended many of the best practices suggested by Giangregorio, et al's "Too Fit to Fracture" consensus on therapeutic exercise and physical activity recommendations for adults with osteoporosis with or without vertebral fractures.

Kathy Shipp, PT, PhD, GCS:

Safe and Effective Exercise for the Post-Fracture Patient

"Exercise is not just about bone mass. We hopefully have types of exercise that can maintain or increase bone mass a small amount. In regard to wrist and hip fractures, we are mostly talking about recovering function and reducing pain."

Studies have shown that one PT session is sufficient for post-wrist fracture patients. There is weak evidence that clinic-based rehabilitation is better than a home exercise program post-wrist fracture. With hip fracture, it is a slightly different story, since, now we know that there are interventions that will return the patient to function. 3 Systematic reviews and 1 Meta-analysis on exercise post-hip fracture conducted in the in-patient setting with patients 73-84 years and 81% female were of lower quality and showed inconsistent outcomes. However, there are studies conducted in "extended care" settings showing better and more consistent outcomes with training that begins after the typical rehabilitation period. Most of these type trials include progressive resistance training with periodic reassessment and increase in exercise intensity. Binder, 2004, compared resistance training in a

gym vs. a home exercise program 4 months after hip fracture where the gym program showed significant improvements in functional status, quad strength, gait speed and balance. Singh, 2012, looked at 124 participants 6-8 weeks after hip fracture performing lower extremity progressive resistance training and balance training for 12 months as compared to usual care and found 81% reduction in risk of death, 84% reduction in risk of NH admission and less decline in Katz ADL and decreased use of assistive devices. Dr. Shipp reported the results of a small pilot study of 26 participants who used a unique portable device with elastic bands for strengthening at home 2xW for 10 weeks. The portable device started with 6-20# of resistance progressing up to 120#. The results were remarkable and showed a significant increase in strength, function, gait speed, 6-min walk, and SF-36 self-reported physical function.

Dr. Shipp stated, "We can safely say that progressive resistance training beginning 2-4 months post-fracture and continuing for 3-12 months positively affects many physical outcomes." Dr. Shipp asked the group how could we implement this in our current Medicare model and could we implement this strategy in our new Fracture Liaison Services?

Debbie Rose: Community Based Exercise Programs: Keeping High Risk Patients Safe

Dr. Rose gave a lively and inspirational talk discussing multi-component programs that included balance, resistance, and flexibility for safe and effective bone health exercise. She highlighted the juxtaposition of power training for balance reactions and focus on control vs. speed in osteoporotic clients. Dr. Rose suggested that exercise teachers make a meaningful connection with each exercise and how it will help functional activities.

"If one is seated, one is not working the balance system!" according to Dr. Rose who specializes in balance training and fall prevention through a program called *FallProof™*. Aerobic Endurance alone is insufficient to manage osteoporosis. Walking may not be enough! She recommended using the acronym, FIT: Freq, Intensity, Type of Exercise and only manipulate one variable at a time.

Dr. Rose recommended exercise programs that are:

- Multi-component
- Full/Partial weightbearing
- 30-60 minutes 3-5 days per week
 - Balance at least 2 days per week
 - Resistance at least 2-3 days per week focusing on FORM before FORCE!
 - 1-2 sets of 8-12 repetitions
 - Perform with control vs. speed
 - Focus on function (lifting, carrying, climbing stairs, squatting)

- Aerobic endurance at least 3-5 days per week (not enough for bone stimulus, should be focused on achieving national guidelines for aerobic activity)

Evidence-Based Exercise Programs:

- BEST Exercise Program from University of Arizona at Tucson
 - Women who improved the most in the amount of weight that they could lift correlated with the greatest increase in BMD
- Boogie for Your Bones: indirectly based on evidence
- Exercise for Better Bones: indirectly based on evidence (not such high quality trials)
- Strong Women Strength Program-by Miriam Nelson

Evidence-Based Fall Prevention Programs: (Note that these are not developed to deal with osteoporosis and may need modification)

- FallProof™
- Otago Home Ex Program: Only delivered by PT's currently
- Stepping On-Multi: faceted program developed by an OT and only delivered by PT/OT's
- Tai Chi: Moving for Better Balance: Repeatedly validated. RCT showed sig red in falls. No efficacy for individuals with osteoporosis

Finding the Right Program:

Safe Movement Practices are crucial. Consumers should look for professionals with specific training in osteoporosis or fall prevention. Resistance and balance training should be a priority.

Rose exclaimed, "If we build it they will come...but will they stay?" We need to incorporate behavior change strategies to keep people motivated to continue their exercise program. Walking poles increase confidence and promote physical activity without the stigma of cane use. She also recommends hip pad protectors.

Karen Kemmis, DPT: Community-based Exercise Programs: Warnings and Choices

Dr. Kemmis discussed important movement precautions for fracture prevention:

- Avoid spine flexion
- Avoid forced or loaded rotation
- Avoid excessive axial compression from above or below
 - Avoid lifting heavy objects overhead
 - Avoid compression from below (i.e. Rollerblading-falls induce compression from below)

Kemmis also discussed many types of popular community-based exercises regarding their risks and benefits:

- Pilates Benefits
 - Increased lung capacity and circulation

- Strength and flexibility
 - Coordination (muscular and mental)
 - Posture, balance and core strength
 - Positive body awareness
 - Pilates Method Alliance www.pilatesmethodalliance.org
- Pilates Risks
 - Less than adequately qualified teachers
 - Knowledge in osteoporosis exercise risks?
 - Abundance of spine flexion and extreme spine motions
 - Look for a PMA certified Pilates teacher who has knowledge of osteoporosis exercise risks and benefits
- Yoga Benefits
 - Increased lung capacity and circulation
 - Strength and flexibility
 - Coordination
 - Posture, balance and core strength
 - Positive body awareness
 - Bone density and joint health may improve
- Yoga Risks
 - Less than adequately qualified teachers
 - Knowledge in osteoporosis exercise risks?
 - Abundance of spine flexion, compression and extreme spine motions
 - Look for a Yoga teacher who has knowledge of osteoporosis exercise risks and benefits
- Zumba
 - Classes typically one hour long
 - Fast music with fast and slow rhythms and resistance training
 - Zumba Gold is a slower version for older adults
 - Potential benefits: strength, aerobic fitness, mobility, coordination, socialization
 - Risks: some moves may need to be modified for the spine and some challenging balance moves may lead to falls
- Tai Chi
 - Mental calm and clarity
 - Stress management
 - Coordination and relaxation
 - Internal circulation
 - Fall prevention
 - Used with Parkinson's disease, diabetes, cancer, and arthritis
 - Low level of risk for osteoporosis

- Curves:
 - Supportive and comfortable atmosphere for women
 - Motto: “No makeup, no men and no mirrors”
 - 30-minute fitness concept: strength training and sustained CV activity, hydraulic resistance, works every major muscle group, stretching and dietary component
 - Low level of risk for osteoporosis-a few moves may need to be modified

- Aquatic Exercise
 - Resistance exercise and aerobic exercise in waist high water
 - Low/no impact
 - Possible strain on bones with props
 - Risks: may not be high enough intensity for bone strain

Thank you to Susan Randall, Dr. Deborah Gold and Dr. Mary Oates and the rest of the program planning committee of this year’s NOF-ISO. There were such excellent, thought-provoking and controversial topics that it will take us all year to synthesize! See you next year on May 12-15, 2016 in Miami Beach!