

Title Page

A Bone Health Screening, Education, and Referral Project in Northwest Iowa: Creating a Model for Community Pharmacies

June Felice Johnson, Pharm.D. and Carrie Koenigsfeld, Pharm.D., are both Associate Professors of Pharmacy Practice, College of Pharmacy & Health Sciences, Drake University, Des Moines.

Laurie Hughell, P.A. was a graduate fellow in the P.A. program at Des Moines University, Osteopathic Medical College, Des Moines at the time of the study.

Rahul Parsa, Ph.D., is a Professor of Statistics and Actuarial Science, College of Business & Public Administration, Drake University, Des Moines.

Susan Bravard, M.S., P.A., is Director of the Geriatric Education Center at Des Moines University, Osteopathic Medical College, Des Moines.

Correspondence: June Felice Johnson, Pharm.D., Drake University, College of Pharmacy and Health Sciences, 2507 University Avenue, Des Moines IA, 50311. Fax: 515-271-4569. Email: june.johnson@drake.edu.

Disclosure: The authors declare no conflicts of interest or financial interests in any products or services mentioned in this article, including grants, employment, gifts, stock holdings, or honoraria.

Acknowledgements: To the community pharmacists and their staff who participated in this project: Mark Anliker and Kim Joyce, Mansmith Pharmacy, Emmetsburg, IA; Wendee Chase, Lewis Family Drug #61, Rock Rapids, IA; John Daniel Jr., Daniel Pharmacy, Fort Dodge, IA; Rachel Kerns and Erika Aldag (pharmacy student), Pocahontas Pharmacy, Pocahontas, IA; and Christine Salters, Bancroft Pharmacy, Bancroft, IA; To the Drake University students who assisted with the screenings or with data entry, and to the collaborating organizations, especially the Northwest Iowa Pharmacy Association and Cynthia Beauman of the Northwest Aging Association.

Funding Source: Community Pharmacy Foundation. Williamston, MI.
www.communitypharmacyfoundation.org

A Bone Health Screening, Education, and Referral Project in Northwest Iowa: Creating a Model for Community Pharmacies

Introduction & Background

Osteoporosis (OP) has become a major public health issue with the aging of our population, the high prevalence of this condition in older patients, and the potential for significant morbidity and mortality related to spine or hip fracture. At least 10 million Americans, mainly women, have OP and an additional 34 million are estimated to have osteopenia. Seventy-seven percent of Americans do not yet have OP but are at increased risk.¹ As a result of OP, quality of life suffers in affected individuals who may experience acute and chronic back pain, disability or limited mobility, and height loss as a result of fracture. The economic costs of treating osteoporotic fractures are significant, ranging from \$12 billion to \$18 billion annually.² Bone fragility is asymptomatic requiring individuals to be informed about risk factors for osteoporotic fracture and to take adequate preventive measures. Nonmodifiable risk factors include a history of fracture in a first degree relative, personal history of fracture as an adult, Caucasian race, advanced age, female sex, dementia, and poor health or frailty. Modifiable risk factors include current cigarette smoking, low body weight (< 127 pounds), estrogen deficiency, low calcium intake, alcoholism, impaired eyesight despite adequate correction, recurrent falls, inadequate physical activity, and poor health or frailty.³ Medications, particularly glucocorticoids, may also be contributing factors.

Rationale for the Project

Despite these well-known and established facts, patients may be unaware of their risks, remain undiagnosed, or receive inadequate treatment. Kirk et al conducted a retrospective chart review of 389 women aged ≥ 50 years old at risk for OP who were patients in a large primary care practice.⁴ The study discovered that only 57% of women with diagnosed OP and 60% with radiographic evidence of osteopenia were receiving antiresorptive therapy. In addition, women with >4 risk factors for OP were less likely to receive antiresorptive therapy compared to women with ≤ 4 risk factors. Andrade et al conducted a retrospective review of automated databases for 7 HMOs in women ≥ 60 years old who had a diagnosed fracture of the hip, vertebra, or wrist.⁵ Only 24% of women received a drug for treatment of their OP during the year following their fracture. The authors noted that increasing age was associated with a reduced likelihood of receiving active treatment for their OP. In another study, peripheral calcaneal bone mineral density (BMD) measurements and serum vitamin D levels were measured and the medical records reviewed for 49 nursing home women.⁶ The authors found that while 59% of women had calcaneal BMD scores in the OP range, a diagnosis of OP was only listed for 17% of these patients. Sixty percent of the women had vitamin D levels corresponding to secondary hyperparathyroidism, and only 10% of the population studied received adequate vitamin D supplementation. In addition, 49% of the women received neither calcium nor vitamin D supplementation.

Some pharmacists have stepped up their efforts to meet the public health challenges posed by unrecognized risks to bone health and are offering programs designed to educate patients on prevention and their need for diagnostic evaluation based on their risk level. A review of the literature found that a few community pharmacists have been successful in providing OP screening and education programs using portable peripheral devices to inform patients about their level of risk for low BMD. The use of peripheral quantitative ultrasound (QUS) as a screening tool has been chosen by community pharmacies based on its accessibility, relative affordability, portability, speed, ease of use, and ability to predict fractures. However, a central DXA (dual-energy X-ray absorptiometry) scan of the femoral neck, total hip, and lumbar vertebrae remains the gold standard for diagnosis of OP with QUS being used only for screening purposes to stratify risk.

Cerulli et al screened 140 women ≥ 18 years old at four chain and two independent pharmacies in Albany, New York using an ultrasound BMD device, the Lunar Achilles Express by GE Lunar Corporation. Their program found that three months after the screening, 42% of women had discussed their BMD results with their physicians, 11% reported improved exercise habits, and 25% had increased their intake of calcium and vitamin D.⁷ Goode et al offered BMD screenings to 532 patients at 22 pharmacies in a regional supermarket chain in Virginia using the Sahara Hologic Ultrasound Bone Densitometer. A total of 70% of patients screened were at either moderate or high risk. Follow-up interviews demonstrated that 37% of moderate or high risk patients scheduled an office visit after the screening, 19% of those screened were started on an OP prevention or treatment medication, and 30% initiated various lifestyle changes.⁸ MacLaughlin et al screened 97 women aged 55 years or older in a patient care center pharmacy after referral from collaborating clinics in Amarillo, Texas. The pharmacists used a peripheral heel ultrasonometer, the Lunar Achilles Express by GE Medical Systems. A total of 56% of patients screened were at moderate or high risk and were referred to a physician for diagnosis. Of this group referred to a physician, 37% completed a DXA scan and of this group completing a DXA scan, 45% were diagnosed with osteopenia and 55% were diagnosed with osteoporosis.⁹ Summers et al provided a 3-day OP screening program at a retail pharmacy in North Carolina. One hundred two participants were screened using the APOLLO Bone Densitometry System. Thirty-four percent were at medium or high risk with 46% of patients discussing results with their provider by six months.¹⁰ Elliot et al provided screenings to 133 participants in five rural Wisconsin pharmacies and found that 22 of 43 (51%) participants completing follow-up surveys had shared their screening results with their provider, and 9 of 22 (41%) had either received a DXA, additional treatment, or both. The low follow-up makes it difficult to establish a true estimate of the program's impact.¹¹

These projects demonstrate the influence pharmacist's bone health programs can have educating patients on steps they can take to reduce modifiable risk factors, using screening results to stratify their level of risk for bone fracture, and working with a physician referral process to increase diagnosis and treatment of women at risk. However, none of the previously published projects developed a transportable, functional toolkit for pharmacists interested in providing this service. In addition, only one project to date has focused on a potentially underserved rural population with limited access to bone specialists or academic medical centers for diagnosis and treatment. Finally, no other

published projects created a broad collaborative partnership between academic medical and pharmacy institutions, community health advocates, regional pharmacy organizations, regional independent community pharmacies, and regional senior citizen organizations. Our project sought to integrate these unique elements into a community pharmacy-directed screening, education, and referral project conducted in the northwest region of our state that would form the basis for a toolkit for all other interested community pharmacies in our state. The project was submitted and approved for funding by the Community Pharmacy Foundation.

Objectives

The objectives of the project were to identify older women at risk for OP, to educate individuals screened on their risks for OP, proper prevention, and treatment options, and to refer patients at risk for further evaluation and discussion with their physician. We also wanted to increase the number of patients engaging in lifestyle changes or receiving preventive or treatment therapies from their providers, and ultimately to create a model that could be easily implemented by community pharmacies interested in offering this program in their pharmacies.

Methods

The Institutional Review Board at Drake University (DU) approved the project protocol and informed consent form. Written informed consent was given by each patient prior to receiving the screening test.

Faculty from the DU College of Pharmacy & Health Sciences and the Des Moines University (DMU) Geriatric Education Center collaborated as investigators on the project. A fellow in the DMU Physician Assistant postgraduate program also actively participated in the project as a component of her graduate curriculum. The faculty practitioners and graduate student were selected based on their experience with community bone screening programs and familiarity with the peripheral screening devices to be used in the project.

The motivation to pursue this project arose when one of the researchers became aware of unmet needs for OP prevention and treatment identified through a student project conducted at a rotation site precepted by one of the authors and located in the northwest area of Iowa. Extrapolating from problems observed at this small site, the author anticipated that this entire rural region of Iowa could form the basis for a pilot project with a goal to transport it other areas in the state. Neither state nor national data was available regarding prevalence of OP in specific geographic areas of the state, and thus for practical reasons the researchers started with northwest Iowa.

Regional provider offices in northwest Iowa were identified from a statewide provider list and selected for contact by the authors if their practice was relevant to the project population. These offices included family practice, internal medicine or general practice, orthopedics, and bone/joint specialists. These provider offices were contacted by mail and subsequently telephoned about the project to inform them of the project objectives and to encourage them to refer appropriate patients for the screenings. They

were also invited to attend a continuing education (CE) program on OP to increase their awareness of prevention, diagnosis, and treatment options.

Letters were mailed to all 69 registered community pharmacists in all 17 counties of northwest Iowa informing them of the project and inviting them to participate. Other methods of soliciting pharmacist participation included direct invitation by officers of the Northwest Iowa Pharmacy Association to its members, advertising by the Iowa Pharmacy Association on its member website, and posting of an announcement on our college's experiential website.

Five independent community pharmacies in northwest Iowa representing five different counties signed a letter of commitment and completed contractual agreements. Each pharmacy site selected a project leader pharmacist who was required to either attend a grant-sponsored CE program on OP or view a videotape of the CE presentation prior to starting the project. Additionally, this pharmacist received training in operating the device, the Achilles InSight by GE Lunar, either at the conclusion of the CE program or at their site prior to the start of the screening. A DU pharmacy faculty and the PA Fellow trained the pharmacists and conducted the screenings in conjunction with the project leader pharmacist at each pharmacy. Pharmacy rotation students assisted in the screenings and in educating patients on their risk factors for OP. Pharmacies were paid a total of \$30 for each patient participating: \$20 from grant funds and \$10 paid directly by the participant at the end of their screening. The total payment of \$30 to pharmacies was determined based on an average market price for bone density screening services, and included project activities of screening, patient education, and phone follow-up of participants at three and six months.

A one-day continuing education event titled "Osteoporosis: Overview of Current Diagnostic, Preventive and Treatment Strategies" was offered for physicians, pharmacists, nurses, nursing home administrators, occupational and physical therapists, and registered dietitians. The conference's purpose was to heighten awareness about osteoporosis and provide current information on risk factors, diagnosis, and prevention and treatment strategies. Specific learning objectives included the following: 1) recall the current status of bone health in the U.S. across the lifespan; 2) list key elements of the recent Surgeon General's Report on osteoporosis and bone health; 3) describe modifiable risk factors for osteopenia/osteoporosis; 4) recognize the role of densitometry in diagnosis of osteoporosis; 5) recall the clinical use, safety, and effectiveness of the following medications used to prevent or treat osteoporosis: calcium/vitamin D; bisphosphonates; SERMS; Forteo; calcitonin; HRT; and 6) describe future developments in prevention and treatment of osteoporosis. The event was held at a private university centrally located in northwest Iowa. Advertising included direct mailing to area physicians, hospitals, long-term care facilities, health care professionals, and the local area agency on aging. Pharmacists earned four contact hours of credit, nurses 4.2, and all other professions were 3.5 hours. Presenters included a geriatrician and two pharmacy faculty members. The event was offered at no charge to the participants.

Drake pharmacy faculty and the PA fellow provided training to the pharmacists and pharmacy staff who participated in the bone density screenings. Pharmacists were able to attend the main training session held at the conclusion of the CE program. During training, attendees received hands-on instruction on how to operate the Achilles Insight device, including entering patient information and running a peripheral bone density test.

An instructional video was viewed prior to demonstration of the device.

The pharmacists became familiarized with the forms and patient education materials that would be used at the screenings, and each pharmacy received a master copy for their reference. Posters regarding osteoporosis, calcium, vitamin D and home safety to prevent falls were also given to the pharmacists to post at the pharmacies. For those pharmacists who were not able to attend the initial training session, individualized training sessions were provided prior to and in conjunction with the screenings.

Older women who were potential participants were recruited for the screenings through a series of radio ads and newspaper advertisements in regional newspapers. The Marketing and Communications department at DU coordinated the advertising, prepared the ads in conjunction with investigators, and contacted the appropriate media for the ads. The radio ads ran for 20-30 seconds up to nineteen times a day Monday through Friday from 5am to 7pm during the one to two weeks prior to the screening. The newspaper ads ran weekly for three weeks prior to the screening, and listed the pharmacy's contact information for patients to schedule their screening appointment. In addition, most of the screening pharmacies advertised the screening through posters displayed in their stores and/or postcards sent or calls made to their own customers. The Northwest Aging Association advertised the screenings to local communities by word of mouth and by posting advertisements in selected senior centers. Women who called a participating pharmacy were screened for eligibility by the project leader pharmacist at each site and chose a specific appointment time on the screening date.

Women were deemed eligible for the screening if they met the following criteria:

- 1) Age 60 years or older.
- 2) No current or previous diagnosis of osteopenia or OP.
- 3) Not currently receiving a medication to treat osteopenia or OP (Fosamax, Actonel, Boniva, Forteo, Evista, Calcitonin)
- 4) Ability to attend the screening on the scheduled date.

Conducting the Screening

Screenings were conducted over one weekday at a participating pharmacy during the month of August or September, 2005. A process map was given to participating pharmacies to outline the steps of the bone density screening process (see appendix). Pharmacy students participated in these screenings. The students were trained on the screening procedure prior to the screening day by the pharmacy faculty and the PA fellow, including how to discuss the results of the screening with the participants

Women who attended the screening day were first asked to read and sign an informed consent form for the project. Participants completed a roster that provided their contact information. Participants also completed a Background Information Form (see appendix) to collect information on age, weight, ethnicity, relevant medical and family history, activity level, calcium intake, and alcohol intake. After completion of all forms, participants were then screened with the Achilles InSight device. The patient's age, sex, and heel screened (right or left) were entered. Following the test, the device printed a report that detailed the patient's T-score, Z-Score, and Stiffness Index (see appendix). A graph was also provided to depict this information. The results were then explained to the patient using the T-score Results Form that classified the patient's T-score into three

categories: >-1 Low Risk, -1 to -2.5 Moderate Risk, and <-2.5 High Risk. It was explained to the patient that these categories are used for screening purposes to enable the pharmacist to quantify the possible risk the patient might have for osteoporosis. Further assessment from the patient's health care provider would be necessary to determine if additional testing should be performed and/or if diagnosis was to be made. Screeners emphasized that this test was only a screening test and not diagnostic for osteoporosis. The Z-score was depicted in the graph provided. The patient's results, indicated by an "x" on the graph, were discussed, as well as the regression of the Z-score curve as a person ages (i.e., the average T-score decreases as age increases). The Stiffness Index was explained as a calculation of the results of the speed of sound traveling through the bone and the broadband ultrasound attenuation, which is an ultrasound pulse sent through the bone. The Stiffness Index is normalized, indicating that a score of 100 is equivalent to the bone quality of a healthy young adult. This Stiffness Index is used to calculate the T-score values provided from the Achilles InSight device.

Participants were given two patient education brochures purchased from the National Osteoporosis Foundation. The first brochure *Osteoporosis: What you Need to Know* provided information regarding the definition of osteoporosis, risk factors, and tips for optimal bone health. Preventative information included "Recommended Daily Calcium Intake", "Good Food for Your Bones", "Calcium and Vitamin D Supplement Information", and "Exercise". The brochure also offered information regarding the diagnosis of osteoporosis and medications available. The second brochure *Living with Osteoporosis* provided information for fall prevention, including actions people can take to avoid falls, information on what to do if a fall occurs, and some general tips to remember. The brochure unfolded to depict a home and methods for making a home safe from falls. The topics within both brochures were discussed with each participant, focusing on patient-specific risk information obtained from the Background Information Form. At the end of each screening, participants were urged to follow up with their health care provider regarding further diagnostic and therapeutic options.

Each screening, including intake and education, took about 15 minutes per participant. Participants received a copy of the signed informed consent and a copy of their risk score to share with their provider. Each pharmacy telephoned participants at three months and six months after the screening to determine whether they had discussed results with their providers, whether any provider or self-initiated changes in treatment or lifestyle had occurred since the screening, and to allow the pharmacists to reinforce education about preventive strategies (see appendix).

Data Analysis

This project was intended to be a descriptive study and as such the volunteer participants in the screening were self-selected based on their willingness to participate. Also, participants had to meet the age criteria and be able to pay \$10 for the results of the screening. This resulted in a non-random sample. Hence, we will not attempt to generalize the results to the population but will summarize the demographic and medical characteristics of the participants. The analysis will identify the proportion of participants screened who were determined to be at high or moderate risk, the proportion of patients referred who had additional testing or changes in their treatment on follow-up,

and the proportion of all patients who self-initiated lifestyle changes. We also examined the relationship between variables noted on the background form and results of the screening T-score by conducting a univariate and multivariate regression analysis of the data. An Excel spreadsheet was used for all data entry, and Excel and SAS statistical package was used for the analysis. The data analysis was performed by a statistician who was not involved with the screening process and who used only patient codes for data entry.

Results

A description of the 159 participants screened is included in Table 1. Medical characteristics and risk factors collected from the Background Information Form are listed in Table 2. Women who met the study requirements were screened at the five participating pharmacies with a range of 45 screened at one of the pharmacies to three screened at another (see Table 3). A majority (87.26%) of the women were Caucasian and had heard about the screenings from newspaper or radio ads (67%) while about one-third of participants heard about the screenings from the participating pharmacy, and, disappointingly, none had been referred by a local provider. Approximately 8% of the participants were of high risk, 45% were of moderate risk and the rest (47%) were of low risk (see Table 4). The most frequently occurring risk factor was postmenopausal status (41%) followed by smoking (29%, current and former smokers), history of a bone fracture after age 45 (21%), early menopause (19%), family history of OP (15%), and rheumatoid arthritis (8%). Medications were rarely cited as a concomitant risk factor, although about one out of four women stated that they took thyroid hormone. Women rarely drank alcohol daily (4 out of 159), and none volunteered that they drank excessive amounts of alcohol. About one-third of women described their activity level as either sedentary or low (active 2 or fewer times per week). Approximately 40% of women had taken or were currently taking estrogen, and almost two-thirds were taking a calcium supplement either with or without vitamin D.

Approximately 53% of women screened were at moderate or high risk based on the T-score obtained during the screening, and were referred to their provider to discuss the results.

The results of the phone follow-up interviews are included in Figure 1. Participants were phoned after three months and again after six months to determine whether or not they had shared the results with their provider since the screening. The phone contact was also intended to determine whether or not any actions were taken by the physician or by the participants on their own, and to provide additional opportunity for the pharmacists to counsel patients on preventive strategies. Pharmacists performing the phone follow-up were able to contact approximately 80% of participants for each survey period. Unfortunately, the unannounced departure of a pharmacist project leader at one pharmacy before the 3-month phone survey resulted in data only being available from 4 sites for the three-month survey. A total of 69 people shared their results with their provider: 38 prior to the three-month survey and 35 prior to the six-month survey. There were four people who contacted their provider prior to three-month survey and also prior to six-month survey. The findings from the surveys are summarized below:

Three-Month Survey: Thirty-seven percent of the respondents indicated speaking to their doctor about the screening results. In 13.46% of the cases, physicians recommended increasing dietary calcium intake and in 6.73% of cases, calcium supplements with vitamin D were recommended. In 4.81% of the cases, the doctor ordered a DXA scan and in 9.62% of the cases increased weight bearing activity was recommended. Respondents were also asked what they changed or did differently on their own. Approximately 50% of the respondents indicated either starting a calcium supplement with or without vitamin D, or increasing intake of dietary calcium. More than 21% of participants contacted indicated increasing weight bearing activity. Regarding pharmacist counseling provided, more than 64% indicated discussing supplemental calcium with vitamin D, and more than 57% indicated discussing dietary calcium as risk factor. Other risk factors discussed by the pharmacist during the phone call and corresponding percentages were: smoking 23.08% of participants contacted, caffeine 36.54%, alcohol 24.04%, weight bearing activity 58.65% and other 0.96%.

Six-Month Survey: Twenty-six percent of respondents who stated they had not spoken to their doctor by the time of the three-month survey indicated speaking to the doctor at the six-month survey. A pivot table analysis revealed that 4 respondents had actually spoken to their doctor prior to three-month survey and also at the six-month survey. In 6.92% of the cases, the doctor recommended a DXA scan, and in 8.46% of the cases, the doctor recommended increased weight bearing activity. Nearly 10% of the respondent's physicians recommended either dietary calcium intake or calcium supplements with vitamin D. Regarding self-initiated activities started since the three-month survey, more than 44% of the respondents indicated starting on calcium supplements with vitamin D and 38.46% indicated increasing dietary calcium intake. Approximately 43.08% indicated increasing weight-bearing activity. Nearly 89% indicated being counseled by the pharmacist regarding supplemental calcium with vitamin D. Regarding the pharmacist's counseling on risk factors, the findings in descending order were: Weight-bearing activity 76.92%, dietary calcium 75.38%, caffeine 43.08%, smoking 26.15%, and other 0.77%.

Discussion

It is difficult to compare the results of our project with those previously published due to variations in the age of participants eligible for the screening, the type of device used, inclusion of both men and women in the screenings, rates of follow-up, and type of pharmacy where the screenings were held.^{7,8,9,10,11} We had an excellent follow-up rate of approximately 80%, a rate that appeared to be higher than other published projects. This may have been due to the use of phone versus mailings for the follow-up surveys, the close relationship of participants with the pharmacists in these independent pharmacies located in rural communities, the diligence and motivation of the participating pharmacies, or other unknown factors. Self-initiated lifestyle changes, including increased activity and increased use of dietary or supplementary calcium, were noted in most projects including ours. More participants appeared to increase their use of calcium and increase their weight-bearing activity as the survey continued, perhaps as a result of the pharmacist's reinforcement of preventive strategies with each phone call. It was disappointing to discover that a DXA was ordered in an extremely small portion of our

patients at risk. This could mean that our monitoring period of only six months was too short for physicians to take action, especially in patients who only visit their physician routinely on an annual basis.

The use of peripheral densitometry to screen patients for OP risk offers greater availability, portability, and relatively lower cost compared to DXA. Ultrasonography of the radius, heel (as used in this project), and hands is one such peripheral technique that can predict an increased risk of fracture by assessing decreased bone density using a stiffness index converted to a T-score. However, the interpretation of these T-scores may not have a predictably high correlation with results from a central DXA.¹² Screening results can, however, assist in determining if referral for a DXA is indicated. A peripherally measured T-score <-1 is an indication for further assessment with a DXA. Peripheral densitometry results can not be used for diagnosis or monitoring treatment for OP, but can alert patients that they may need further medical evaluation. The broader access to pharmacists in their communities gives patients an opportunity to receive credible information on their risk factors without perceptions of inconvenience or excess expense that may delay proper diagnosis and treatment. According to the USPSTF (U.S Preventive Services Task Force), NOF (National Osteoporosis Foundation), and AACE (American Association of Clinical Endocrinologists), all women ≥ 65 years old should receive an evaluation of BMD. In addition, these organizations recommend that women between the ages of 60 and 65 who have multiple risk factors undergo BMD testing.¹² It is on this basis that we offered our screening program to women 60 years of age and older.

There are a number of limitations to a project of this nature. These limitations include lack of randomization, potential recall bias from patients' self-reported information ("forget" was a frequent phone response), attrition due to participants exiting our state for warmer climates over the winter months, lack of generalizability due to patient self-selection, pharmacy selection bias due to the highly motivated pharmacists participating, and apparent lack of provider "buy-in" as evidenced by lack of referrals to the screenings, among others. We attempted to minimize bias by coding all records and blinding the data analyst to study participants' identity. We also minimized errors in the process by providing each pharmacy site with a plastic file box complete with all forms pre-coded, forms that were prepared in multiple copies to eliminate need to copy documents at the site, and all necessary supplies to conduct the screening.

A short survey was faxed to participating pharmacists to determine their feedback on the project. On a positive note, all felt it was well organized, added value to their practice, was useful regarding professional skill development, especially in communicating results to physicians, and enhanced relationships with their patients. Also, patients were generally appreciative of the follow-up phone calls and the extra contact outside the pharmacy store. A couple of problems mentioned were the inability of the pharmacists to contact all the patients by phone, especially over the winter months when many travel to warmer climates, and negative perception by some providers of the screening either as competing with their own screening activities or not having value. Most of the pharmacists did not feel they gained more patients from the project, but one noted that the participants would like to attend more services of this type offered by the pharmacy and another noted that their store experienced an increase in the sales of calcium and vitamin D supplements both during and after the screening. All pharmacists

wanted to continue the screenings but would need personnel and equipment support to continue the same type of screening since none of them owned their own peripheral bone screening device.

Conclusion

The majority of women ≥ 60 years old living in a rural region of Iowa and attending a bone density screening day at five community pharmacies were categorized as moderate or high risk for osteoporosis. A substantial proportion of women changed their calcium intake, activity level, or made other lifestyle modifications after six months of pharmacist follow-up. Slightly over one-third of patients screened discussed results with their provider with a small proportion receiving either diagnostic work-up or additional treatment from their provider. Participating pharmacists wanted to continue offering this bone screening program to their patients but needed both personnel support and screening equipment to sustain this service. A toolkit will be created for community pharmacists in Iowa that will provide them with the procedures, forms, educational materials, faculty consultant, and other support needed to offer this service to their patients.

References

1. National Osteoporosis Foundation web site. Fast facts. Accessed 12/2/06 at www.nof.org/osteoporosis/diseasefacts.htm.
2. U.S. Department of Health and Human Services. Bone health and osteoporosis: a report of the Surgeon General. U.S. Department of Health and Human Services. Office of the Surgeon General. Rockville, Md. 2004. Accessed 12/2/06 at www.surgeongeneral.gov
3. Osteoporosis. Physician's guide to prevention and treatment of osteoporosis. National Osteoporosis Foundation. Washington, D.C. 1999.
4. Kirk JK, Spangler JG, Celestino FS. Prevalence of osteoporosis risk factors and treatment among women aged 50 years and older. *Pharmacotherapy*. 2000;20(4):405-409.
5. Andrade SE, Majumdar SR, Chan KA et al. Low frequency of treatment of osteoporosis among postmenopausal women following a fracture. *Arch Intern Med*. 2003;163:2052-57.
6. Elliott ME, Binkley NC, Carnes M et al. Fracture risks for women in long-term care: High prevalence of calcaneal osteoporosis and hypovitaminosis D. *Pharmacotherapy*. 2003. 23(6): 702-10.
7. Cerulli J, Zeolla MM. Impact and feasibility of a community pharmacy bone mineral density screening and education program. *J Am Pharm Assoc*. 2004;44:161-67.
8. Goode JV, Swiger K, Bluml BM. Regional osteoporosis screening, referral, and monitoring program in community pharmacies: Findings from Project ImPACT: Osteoporosis. *J Am Pharm Assoc*. 2004;44:152-60.
9. MacLaughlin EJ, MacLaughlin AA, Snella KA et al. Osteoporosis screening and education in community pharmacies using a team approach. *Pharmacotherapy*. 2005;25(3): 379-86.
10. Summers KM, Brock TP. Impact of pharmacist-led community bone mineral density screenings. *Ann Pharmacother*. 2005;39:243-48.
12. Elliot ME, Meek PD, Kanous NL et al. Pharmacy-based bone mass measurements to assess osteoporosis risk. *Ann Pharmacother*. 2002;36:571-77.
13. Raisz LG. Screening for osteoporosis. *N Engl J Med*. 2005;353(2):164-71.

Table 1. Characteristics of Participants

Characteristics	Number (%) (n=159)^a
<i>Demographics:</i>	
- Mean age (+/- S.D.)	71.51 (8.04)
- Mean weight in lbs. (+/- S.D.)	156.93 (29.81)
- Mean BMI (+/- S.D.)	27.07 (5.06)
<i>Ethnicity:</i>	
- Caucasian	137 (86)
- Native American	6 (3.8)
- African American	1 (0.63)
- Hispanic	0
- Asian	0
- Other	2 (1.23)
<i>Learned about screening through:</i> ^b	
- Newspaper	106 (66.67)
- Pharmacy	55 (34.59)
- TV	9 (5.66)
- Radio	5 (3.14)
- Community Center	1 (0.63)
- Physician	(0)
- Other	13 (8.81) ^c

^a May not add up to 159 since answers may have been left blank.

^b Total is > 100% due to ability of participants to check more than one box.

^c Other may include word of mouth between participants.

Table 2: Medical Characteristics and Risk Factors

<i>Brief medical history:</i>	
- Use prescription estrogen or HRT	21 (13.21)
- Ever received prescription estrogen	63 (39.62)
- Receive thyroid hormone	43 (27.04)
- Take calcium supplement with vitamin D	91 (57.23)
- Take calcium supplement without vitamin D	9 (5.66)
- Use heparin	0
- Take a seizure medicine	1 (0.63)
- Use Nolvadex	7 (4.4)
<i>Potential medical risk factors:</i>	
- Family history of OP	24 (15)
- Early menopause	30 (19)
- Postmenopausal	64 (40)
- Smoker (current) ^a	7 (4.4)
- # of years smoked, current (+/- S.D.)	39.29 (9.98)
- Smoker (former)	34 (21.4)
- # of years smoked, former	22.71 (5.34)
- Bone fracture after age 45	33 (21)
- Rheumatoid arthritis	13 (8)
<i>Other risk factors:</i>	
- Sedentary or active < 2 times/week	53 (33)
- Daily alcohol	4 (2.5)

^a Total # of responses to current or former smoker was 46 but only 41 answered # of years.

Table 3. Distribution of Participants

Pharmacy	County	# Participants
Bancroft	Kossuth	3
Daniel	Webster	40
Lewis	Lyon	45
Mansmith	Palo Alto	42
Pocahontas	Pocahontas	29
TOTAL		159

Table 4. T-scores of Participants*

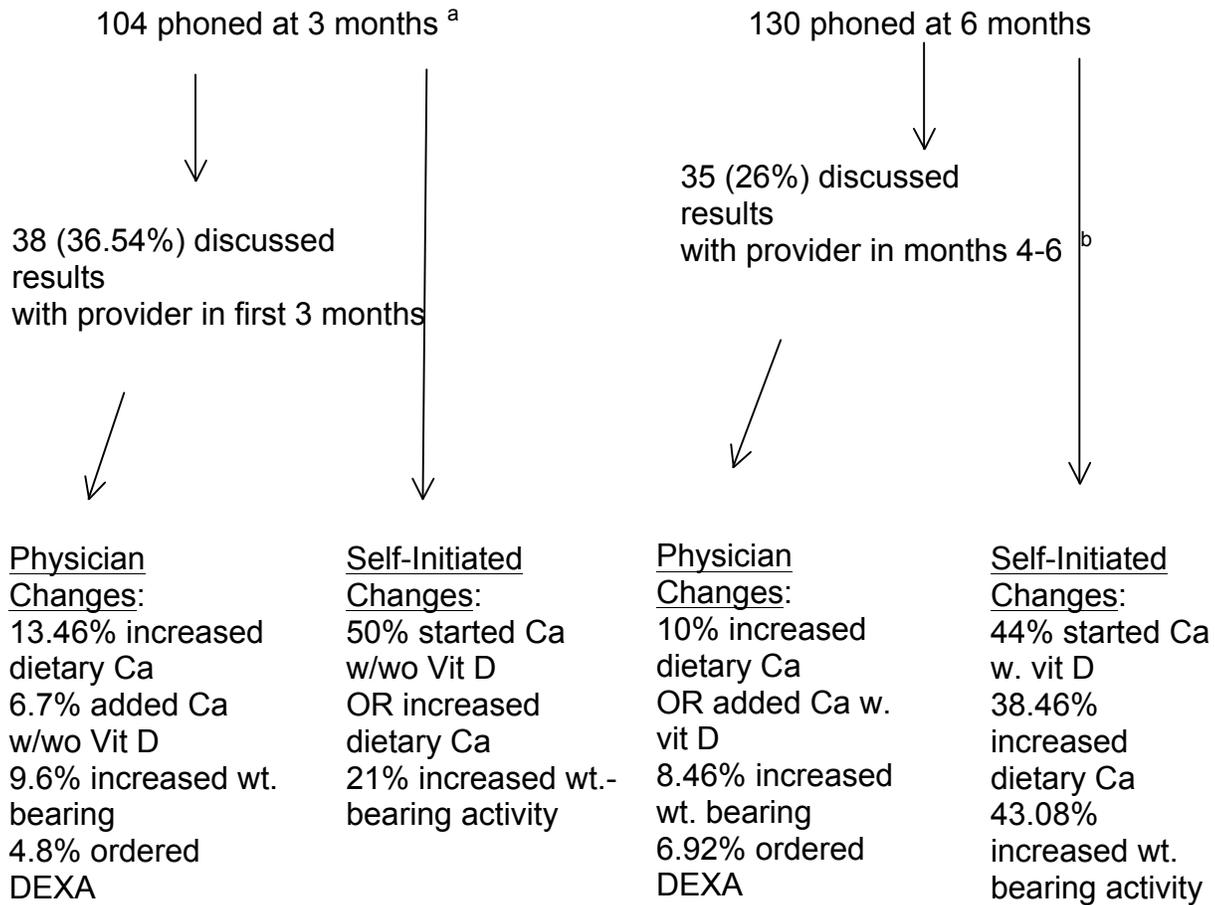
Risk Level	# of Participants (%)
Low	75 (47)
Moderate	71 (45)
High	13 (8)
Moderate + High	84 (53)

*Low= T-score > -1

Moderate= T-score -1 to -2.5

High= T-score < -2.5

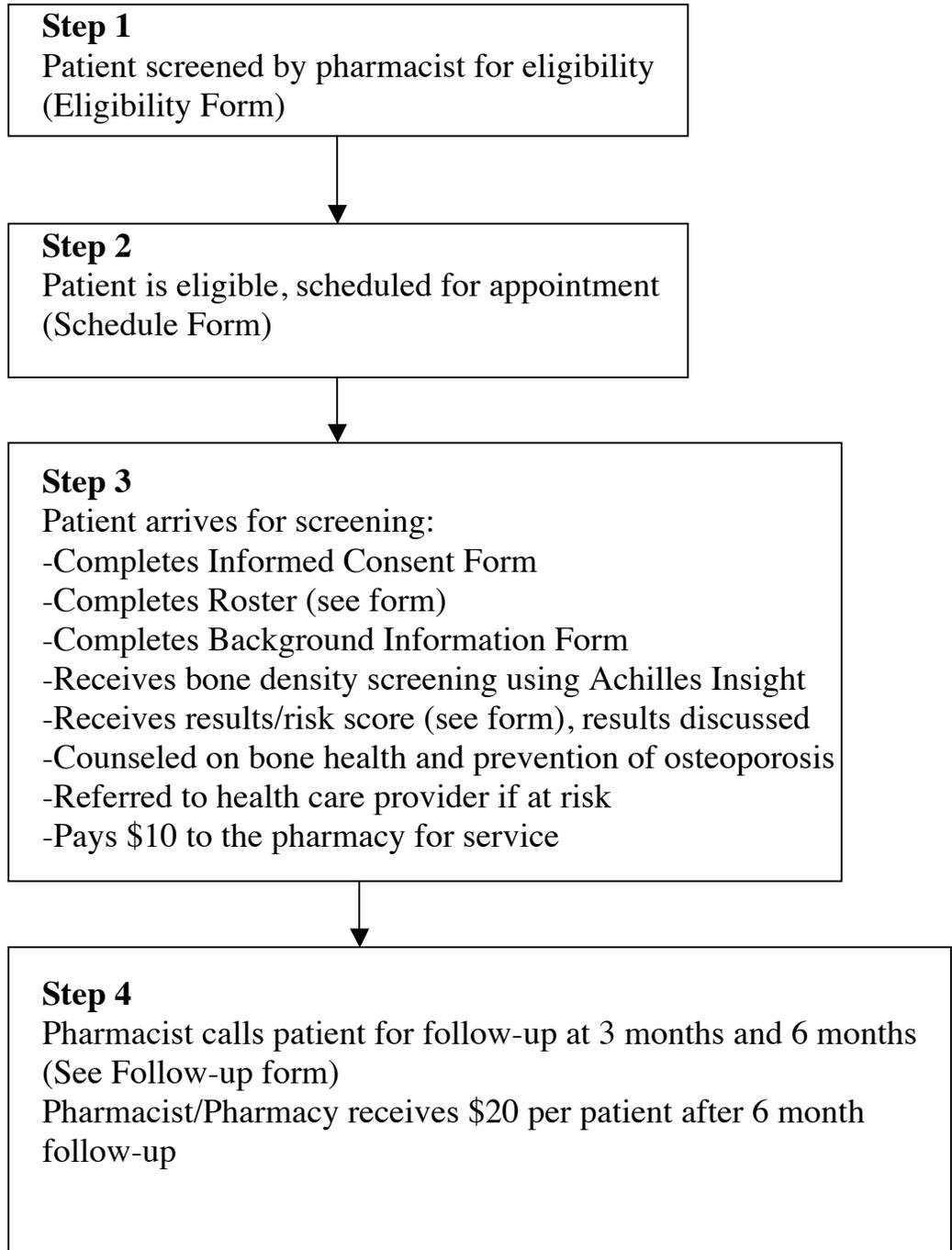
Figure 1. Telephone Follow-Up at 3 months and 6 months



^a: One pharmacy did not complete 3-mo. f/u on 29 patients

^b: 4 of 35 patients had also discussed with physician at 3-months

**Bone Health Project
PROCESS MAP**



Osteoporosis Screening Project Background Information Form

Age (in Years): _____ Height: _____ Weight: _____

Ethnicity: African American
(Check one) Asian
 Caucasian
 Hispanic
 Native American
 Other (please write in):

I heard about this screening through (check all that apply):

Newspaper Radio Pharmacy/Pharmacist
 Television Community Center Physician/Health
Care Provider
 Other (please write in): _____

Brief Medical History: Check all that apply if you currently take any of these medicines:

- CURRENT prescription estrogen or hormone replacement
- EVER received prescription estrogen
- Thyroid hormone
- Calcium supplements **with** Vitamin D
- Calcium supplements **without** vitamin D
- Heparin (long-term)
- Steroids (for example, prednisone)
- Seizure medicines: Dilantin (phenytoin) OR Phenobarbital OR Tegretol (carbamazepine)
- Nolvadex (tamoxifen) (premenopausal use)

Check all that apply to you:

- Family history of osteoporosis
- Early menopause (before age 45)
- Postmenopausal
- Smoking: Former smoker o How Long? _____ Years
 Current smoker o How Long? _____ Years
- Bone fracture(s) after age 45
 - If YES, where was the fracture? Wrist Hip Rib
 - Other: _____

- Rheumatoid arthritis

Check the weight-bearing activity level that best applies to you:

(Examples: Walking, jogging, stair climbing, dancing, tennis, weight lifting)

- Sedentary (no activity)
- Active 1 to 2 times per week
- Active more than 2 times per week

I would describe my dietary calcium intake as:

- Inadequate
- Adequate
- Lactose intolerant: Yes No

I would describe my alcohol intake as:

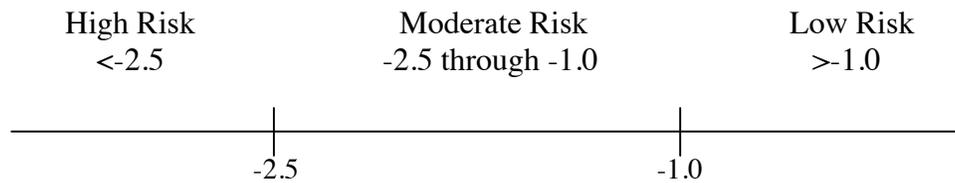
- Never use
- Rare (Less than 1 per month)
- Monthly (about 1 per month)
- Weekly (about 1 per week)
- Daily (1 or more drinks per day)

What the results of your Achilles InSight scan tells you....

Your T-score:

Your Stiffness Index:

The T-score is a measurement that compares your BMD to that of a healthy young adult population. It is classified as follows:



It is important to note that peripheral bone density scans of the heel are not necessarily an exact match of the bone density found in other parts of the skeleton. Therefore, if you have a T-score of < -1.0 , you should see your physician for further assessment and evaluation of bone loss, as well as possible treatment options.

The stiffness index is calculated based on the results of the speed of sound traveling through the bone and the broadband ultrasound attenuation, which is an ultrasound pulse sent through the bone.

The stiffness index is normalized, so that a score of 100 is equivalent to the bone quality of a healthy young adult. It is this stiffness index that is used to calculate the T-score values, which is the value that should be ultimately used to assess your risk.

Bone Health Project:
Phone F/U: 3 months

Please ask the patient the following questions and record the response.

1. Have you talked with your doctor about the results of your bone density screening we conducted at (give *name of pharmacy*) about 3 months ago?

Yes No

2. If YES, what did your doctor decide to do? (Check all that apply) If NO, go to Q3.

Ordered or performed a DEXA scan

If checked, list t-score: _____

Stopped some of my medications: (List)

Started me on:

Calcium supplements with Vitamin D

Calcium supplements without Vitamin D

Fosamax Evista

Actonel Estrogen/HRT

Boniva Calcitonin (Miacalcin)

Forteo injections

Encouraged me to increase my dietary calcium intake

Encouraged me to increase my weight-bearing activity

3. What did YOU change or do differently ON YOUR OWN? (Check all that apply)

Started on calcium supplements, No VitD

Started on calcium supplements W. VitD

Increased my dietary calcium

Increased my weight-bearing activity (either length of activity or # days/wk)

Stopped smoking (if smoker)

Reduced my caffeine intake

Reduced my alcohol intake

4. Counseling points covered by pharmacist during phone F/U:

Supplemental calcium w. Vit D

Risk factors: Smoking Caffeine Alcohol Weight-bearing activity

Dietary calcium Other: _____

Bone Health Project:
Phone F/U: 6 months

Please ask the patient the following questions and record the response.

1. If you had NOT talked with your doctor at 3 months, have you since our last phone call?

Yes No

2. If YES, what did your doctor decide to do? (Check all that apply) If NO, go to Q3.

Ordered or performed a DEXA scan

 If checked, list t-score: _____

Stopped some of my medications: (List)

Started me on:

Calcium supplements with Vitamin D

Calcium supplements without Vitamin D

Fosamax Evista

Actonel Estrogen/HRT

Boniva Calcitonin (Miacalcin)

Forteo injections

Encouraged me to increase my dietary calcium intake

Encouraged me to increase my weight-bearing activity

3. What have you STARTED or CONTINUED since our previous phone call?

Use of calcium supplements, No VitD

Use of calcium supplements W. VitD

Increases in my dietary calcium

Increases in my weight-bearing activity (either length of activity or # days/wk)

Quit smoking (if smoker)

Reduced my caffeine intake

Reduced my alcohol intake

4. Counseling points covered by pharmacist during phone F/U:

Supplemental calcium w. Vit D

Risk factors: Smoking Caffeine Alcohol Weight-bearing activity

Dietary calcium Other: _____