

The fracture liaison service: its history, current state, how it works, and future directions

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Abstract

Osteoporotic fractures often result in reduced function after healing, with associated pain, disability, loss of independence, and reduced quality of life. Following osteoporotic fractures, it is common for older adults to sustain subsequent, or secondary, fractures. These fractures include those of the proximal femur, vertebrae, distal radius, proximal humerus, and other sites. Although widely recognized as a gap in care, the implementation of appropriate secondary fracture prevention programs has been carried out in most countries. A Fracture Liaison Service represents the best secondary fracture prevention model of care for managing osteoporosis following fragility fractures and falls. These programs have proven to be cost-effective, and represent a major advancement in patient care over those “usual care practices” seen in most community and academic medical centers. Key Fracture Liaison Service programmatic functions include case finding, patient assessment, osteoporosis assessment, initiation of osteoporosis treatment, falls prevention, education, and exercise.

Keywords: falls prevention, fracture liaison service, osteoporosis, osteoporosis medication, secondary fracture prevention

1. Introduction

Osteoporotic fractures frequently occur in older adults and often result in reduced mobility after healing, pain, disability, loss of independence, and a reduced quality of life. Following an osteoporotic fracture, it is common for older adults to fracture another bone which is commonly referred to as a secondary fracture. Secondary fracture prevention remains a major problem in most countries following the treatment of hip fracture, vertebral fracture, distal radius fracture, proximal humerus fracture, and other fragility fractures. Although widely recognized as a treatment gap, limited implementation of appropriate secondary fracture prevention programs has been carried out in most countries. The Fracture Liaison Service (FLS) was originally described in Glasgow, Scotland in 2003 by Dr McLellan et al^[1] and has evolved into a widely recognized and successful approach toward managing the bone health of patients who have experienced a fragility fracture. The original

program was led by nurses and involved identification of appropriate patients for assessment, bone mineral density testing, and making appropriate recommendations for management of the osteoporosis.^[1] In 2007, the original FLS team published recommendations for the management of those patients who fracture after assessment and treatment by an FLS program. They suggested inclusion of a falls prevention intervention as part of a FLS program.^[2] Following the description of FLS, the program has been replicated successfully in other locations. First used in the UK successfully and then other countries, the FLS program has become recognized as the most successful approach to achieve secondary prevention.

2. How does a FLS work?

An effective FLS program will significantly improve health of older adults in their community. FLS programs include several phases of activities: case finding, patient assessment, osteoporosis assessment, initiation of osteoporosis treatment, falls prevention, education, and exercise. FLS programs are typically run by specifically trained Advanced Practice Providers, such as nurse practitioners. FLS programs can be cost-effective and represent major improvements in patient care over “usual care practices” seen in most community and academic medical centers.

2.1. Patient identification (case finding)

The first task is that of patient identification often referred to as case finding. This can be done by direct referral from the treating physician or advanced practice provider to a FLS program. Such referrals are made with an electronic medical record, phone call, or email message. This approach has not been as reliable or comprehensive as an automated approach. An automated approach is done with electronic patient identification based on the entered diagnosis which in turn triggers an electronic referral to the FLS. When the treating provider sees the patient with a triggering fragility fracture (e.g., distal radius fracture, hip fracture, vertebral body fracture, or a proximal humerus fracture), a diagnosis is entered into the system which would have been preselected as qualifying for FLS referral. A report can

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be generated by diagnosis and the patient referral can be made via automated report to the FLS. This automated referral process has been used within the framework of a national health system but also within closed panel health maintenance organizations such as the Kaiser Health or the Geisinger Health systems in the United States.

Proper patient identification represents an essential activity in every FLS program. This begins with defining the population of patients who require the services of the FLS. Many FLS programs wish to see all patients older than 50 years with any fracture, some programs focus on specific low energy fractures of the distal radius, proximal humerus, hip, or vertebra. It is essential to have consistent criteria for referral to the FLS.^[3,4] The mechanisms of identification include manual abstraction of cases, electronic reminder systems in the electronic medical record (best practice alerts), and electronic case finding based on diagnosis with automated referral to a FLS. The latter approach has been documented to be particularly effective in case finding.^[5,6] Once the patients have been identified, referral and scheduling them with the FLS should occur.

2.2. Patient assessment

The initial assessment begins with a detailed history of the present problem, such as recent fracture. The mechanism of injury, treatment received, and history of prior fractures should be sought. It has been clearly shown that a patient who has sustained a low-energy fracture has a greater absolute risk of a subsequent fracture in the future.^[7] This will allow the injury mechanism to be classified as low, medium, or high energy. Additionally, feedback provided by the orthopaedic surgeon to the patient should be recorded. Comments often include references to poor bone quality discovered at surgery or during fracture reduction. A careful family history should also be obtained from the patient, including history of hip fracture or multiple fractures in the patient's parents, siblings, or other close relatives. A maternal history of hip fractures is particularly valuable. If the family history of osteoporosis is present additional detail should be sought.

History of prior treatment for osteoporosis or bone health should be identified and recorded in detail, including which medicines have been used, for how long, treatment adherence by the patient, side effects, and other pertinent data including laboratory results. Any prior DEXA scans should be sought and assessed. Prior DEXA scans should be scanned and incorporated into the medical record. Current medication use, as well as past medication history, should be identified and recorded particularly with reference to medications that are known to be harmful to bone quality such as steroids, proton pump inhibitors, anticonvulsants, and others such as antihormonal treatment that might be utilized for cancer treatment.

It is helpful to assess an older adult for the presence of physical geriatric frailty. There are many ways to do a frailty assessment, but most revolve around assessment of diminished physical activity, unintentional loss of weight, exhaustion, slow walking speed, and loss of physical strength (grip strength).^[8,9] The frail elderly patients are at particularly high risk for fracture and adverse outcomes.

A key aspect of the FLS assessment is a falls assessment.^[10] This includes a detailed history of falls, fear of falling on the part of the patient, and household hazards that may be present. For example, the house may be in a significant state of disorder with multiple tripping hazards. Pets may represent a significant tripping hazard to older adults. Treatment for the falls in the

form of prevention such as physical therapy should also be identified. Specific causes for the falls should also be identified including poor vision-cataracts, unstable joints, painful feet, neurologic conditions that cause gait disturbance or imbalance, and other potential causes of falling including syncope. Additionally, a dietary history, use of alcohol, tobacco, and drugs should be obtained which may contribute to development of osteoporosis or falls.

The physical examination should consist of a detailed examination including posture, observation of balance, observation of gait, identification of deformed or painful joints. Unstable joints should also be identified. Specific neurological and vision assessment can be referred to a specialist as needed. Ultimately, an assessment of the patient's bone health and falls assessment including risk of future falling should be determined.

2.3. Osteoporosis assessment

Specific assessment of the bone health of the patient is an essential task for the FLS service. This will include obtaining a DEXA scan and comparing it with prior scans. These are typically performed every 2 years and ideally obtained on the same machine as the prior studies, which allows for comparative trend bone mineral density evaluation. Specific laboratory values that are frequently obtained include calcium level, serum parathyroid hormone level, serum thyroid hormone level or thyroid stimulating hormone level, 25-hydroxy vitamin D level, and specific bone turnover markers. These include urinary C-telopeptide, N-telopeptide, and serum Procollagen Type I N-terminal propeptide (PINP). These tests can provide a good understanding of bone turnover activity within the patient's skeleton. Bone turnover markers are particularly useful in identifying cases of high bone turnover osteoporosis as frequently seen in menopause and in steroid use.

2.4. Falls prevention

Falls prevention begins with identification of the causes of falling. This may be obvious in the case of tripping on a specific object, but may be more subtle. Advanced age is an independent risk factor for falls.^[11] Poor vision associated with cataracts can be managed with at least 1 cataract correction. Neurologic conditions should be identified and treated with the appropriate neurology specialist. At particularly high risk are patients with Parkinson disease who may experience issues with gait and osteoporosis resulting in frequent, significant fractures. Particularly troublesome for patients with Parkinson's disease are the gait disturbances which include freezing of gait and propulsion.

Some causes of falls are addressable in a straightforward manner. Replacement of an unstable knee with a high-quality knee replacement is one such example. Correction of a painful foot condition is another. Patients with slow cardiac rate may be addressed with a pacemaker in some cases. Polypharmacy is another important cause of falls. Psychoactive medications, blood pressure medications, and sedatives have all been implicated as causes for falls. A physical therapist can be of help in assessing causes of falls from gait abnormalities. Physical therapy involvement can also help the patient with frequent falls to strengthen their lower extremities and manage challenging gait abnormalities.

2.5. Education

An essential element to any high-performing FLS program is patient and family education. The FLS coordinator should

educate the patient/family about their diagnosis, current state, treatment plan, and future prognosis. This should start with a detailed explanation of the diagnosis. The diagnosis may be known at the time of the first visit or may become clear as the workup progresses. A diagnosis of primary osteoporosis should only be made after exclusion of secondary causes such as a low vitamin D level, primary hyperparathyroidism, or medication induced low bone mass.

Current status of the patient should be explained in detail to the patient and family accompanying them. This should include their DEXA scan and laboratory results, a review of their healing status for current or prior fractures, and gait stability. When explaining the treatment plan, it is essential to emphasize that osteoporosis is typically not symptomatic until the time of fracture. The need to adhere to the prescribed treatment is essential. This should also include a very careful and thoughtful review of medication side effects. Some common causes for discontinuing treatment for osteoporosis are another physician telling the patient that the treatment is not necessary, financial issues, side effects of the medication, and older age.^[12] The concept of medication adherence should be woven into a discussion of need for treatment and benefits for treatment. The future prognosis is readily obtained by using the FRAX score published by the World Health Organization. Careful discussion of the implications of future falls and fractures should be explained including potential loss of independent living which is greatly feared by many older adults. This may help to motivate the patient to adhere to treatment and follow-up with the FLS provider. Many educational aids are available from industry on the specific product selected for treatment. Such educational tools may be very valuable for the patient. These include informational brochures, sample subcutaneous drug delivery device teaching models, and informational videos.

2.6. Exercise programs

As far as general exercise programs that have been shown to reduce patient falls, Tai Chi stands out as a good group intervention that has been successfully used in many venues.^[13] One study of community dwelling women has demonstrated benefit of amino acid supplementation and exercise on gait speed and strength.^[14] Another study failed to demonstrate benefits of Vitamin D and exercise on the function of older adults.^[15] One of the major problems seen in older adults is sarcopenia. This condition includes a loss of muscle mass and muscle function. Sarcopenia represents a major issue for many older adults and contributes to falls, reduced gait speed, and physical inactivity. Strength and balance training are helpful to many older adults. Although there is no pharmacologic treatment for sarcopenia, clinicians should confirm that older adults have adequate levels of vitamin D (> 32 ng/dL). Low vitamin D levels have been associated with muscle weakness and falls in observational studies.^[16]

3. Conclusion

The Fracture Liaison Service represents the best secondary fracture prevention model of care for managing post fracture osteoporosis and falls. It is typically run by a specially trained Advanced Practice Provider such as a nurse practitioner. A FLS program can be cost-effective, and represents a major improvement in patient care over “usual care practices” seen in most communities and academic medical centers. Key features of the FLS program include case finding, patient assessment, osteoporosis assessment, initiation of osteoporosis treatment, and falls prevention. An effective FLS program will significantly improve health of older adults in their community.

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