



# The Role of Geriatric Orthopaedics in Managing Fragility Fractures: Exploring How Multidisciplinary Approaches, Including Surgical Intervention, Pharmacotherapy, and Rehabilitation, Improve Outcomes in Elderly Patients with Osteoporotic Fractures

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## Abstract

**Background:** Of Yearly fractures related to osteoporosis also known as fragility fractures occur most frequently in elderly and result in highest morbidity, immobility and mortality. Four of the more frequent types of fractures are hip, vertebral, and wrist fractures and sometimes present management challenges in elderly patients because of their concurrent diseases. These fractures seem to be on the rise and geriatric orthopaedics is very vital in the management of such conditions as breaking them down more into surgical, pharmacological and even rehabilitative interventions.

**Aim:** The purpose of the present work is to examine how geriatric orthopaedics enhance the care for elderly patients with osteoporotic fractures by considering surgical, medical, and rehabilitation management.

**Methods:** Retrospective cohort analysis of elderly patients (at least 65 years) with osteoporotic fractures confirmed by image findings was used, as well as the use of surgical treatment (internal fixation, arthroplasty), pharmacological (bisphosphonates, calcium, vitamin D), and rehabilitation regimes. The assessment of the results was based upon properties such as fracture healing, re-fracture rate, mobility, independence and overall mortality.

**Results:** The overall patient outcomes of timely surgery, pharmacotherapy, and early rehabilitation appeared to yield shorter healing time, decreased re-fracture rate, better functional recovery, and increased quality of life of the patients than those

of the single-modality treatment. Long-term compliance with the pharmacological treatment was effective in preventing further fractures; on the other hand, early mobility was essential in achieving the functional level of independence. Conclusion: Healthcare management inclusive of interdisciplinary models in geriatric orthopaedics yields favourable clinical and functional results in elderly patients with fragility fractures. This analysis confirms the need for multimodal approach to care for individuals affected with this condition in order to enhance their surgical, pharmacological, and rehabilitative outcomes. Integrated care solutions should therefore form the cornerstone of such healthcare organizations caring for the elderly and their osteoporotic fractures.

Keywords: Fragility fractures, osteoporosis, geriatric orthopedics, multidisciplinary care, surgery, pharmacotherapy, rehabilitation, elderly, fracture management.

## Introduction

Hip and distal femur fragility fractures secondary to fall from standing height are common in elderly patients. They are a significant source of public health concern as the world population's mean age rises. Fragility fracture is a term closely related to osteoporosis, a skeletal disorder defined by low bone mineral density and microarchitectural alterations in bone tissue.

Osteoporosis greatly amplifies the propensity for fractures to occur whether by slender force or stress. Osteoporosis and related fractures are more common with advanced age, especially above the age of sixty-five years, and far proportions are found among females due to postmenopausal bone mass reduction. The World Health Organization estimates that over 200 million people suffer from osteoporosis and millions of fractures occur each year [1]. These include hip, spine and wrist since they have the most biomechanical stress in the elderly. These are some of the severities that include But the most frequent and serious fractures are hip fractures, which worsen the patient's mobility and self-sufficiency. Fractures of the hip constitute more than 1.6 million hospital admissions globally each year, and this number is anticipated to rise as the life span lengthens. Secondary osteoporosis can cause vertebral fractures, which may be asymptomatic or overlooked, but will minimise an individual's quality of life through pain and deformity. Hand fractures although are not as deadly as thorax and abdomen injuries compromise function and can lead to a drastic decrease in an individual's functionality, especially in everyday life.

Finally, while fragility fractures cause pain and disability, they also significantly predict the risk of secondary fractures, and increase morbidity and mortality in elderly populations [2].

Fragility fractures depend substantially on osteoporosis in the process of the disease's formation. This poses erosion of architectural integrity through loss of BMD and alterations of the normal bone structure thus increasing the occurrences of bone fracture.

More than age-related bone loss, osteoporosis leads to increased bone density and increased bone loss over time. Osteoporosis involves a decreased rate of bone formation and an increased rate of bone resorption, resulting in what are considered brittle bones which can fracture due to some force. Apart from the biological changes of aging, other factors further contribute to bone loss because of inactivity, hormonal changes- almost all hormones decrease with age but the estrogen level especially in postmenopausal women decline greatly, inadequate calcium, vitamin D. Hence, osteoporosis not only, doubles the chance of the first fracture but also leads to the so- called fracture cascade meaning that one fragility fracture greatly increases the risk of the subsequent ones [3].

However, fragile bone fractures are also seen in patients with other diseases or other disease states which makes the overall management more challenging. The osteoporosis patients are almost always elderly and are often plagued with arthritis, diabetes, cardiovascular complications, and pre-disposition to dementia, making the reliability of the bones precarious and the chances of falling high,

besides, such patients take longer time to heal after any type of fracture. Again, these diseases in conjunction with osteoporosis are difficult to manage, and their occurrence takes a complicated clinical picture. The three most frequently affected areas in the elderly are the hip, spine, and wrists, and each area poses unique problems in treatment. Hip fractures are especially dangerous due to the long time that patients spend in the hospital, an even longer time in rehabilitation, and loss of a major degree of independence. Hip-fractured patients often do not gain the pre-fracture functional status back, and approximately 20% of those patients will die within one year of the fracture due to infections or other related complications such as thromboembolism. Thus, vertebral fractures, which are a frequent occurrence but often unrecognized, may cause kyphosis, chronic pain, and decrease in pulmonary vital capacity owing to lung compression. Another use of vertebral fractures is as a warning sign of the future chances of fractures at other sites, such as the hip. Although not as dangerous in terms of first hour mortality as cranial fractures, wrist fractures can have a hug effect on independence in activities of daily living, such as dressing, cooking or self care. Hand disability reduces the overall quality of life of the patient and hastens the loss of independence of elderly patients [4]. The subject of Geriatric Orthopaedics

Geriatric orthopaedics has assumed an important responsibility of handling fragility fractures because of changes in the demography and the high incidence of osteoporosis. Orthopaedics of geriatric pertains to the area of orthopaedics that deals with disorders of the

musculoskeletal system in geriatrics with special attention given to fractures related to conditions such as osteoporosis. Geriatric patients have special demands that set them apart from youthful people who visit the doctor. Elderly patients have delayed healing, and they present with more complications mainly because of complications that are related to multiple morbidities or reduced physiological reserve. Fracture care in elderly patients is not just a surgical procedure that can be performed but it involves knowledge of numerous overall medical issues the patients usually present.

For example, elderly patients who were admitted for fractured necks of femur had increased likelihoods of having fallen at home, dementia, or taking multiple drugs which are all factors that would influence surgery, recovery and subsequent management. Geriatric orthopaedic surgeons must therefore work in teams with other health care professionals to deliver health care that targets the well being of the patient after fracture and also the overall health of the individual.

Consequently, specialized care for elderly patient with FF is crucial so that better outcomes and low rate of complication can be achieved. Because many of these patients have comorbidities, chronic diseases, and potentially altered physiology, the coordinated, collaborative care of general surgeons, geriatricians, endocrinologists, physical therapists, and nursing staff is mandatory. It covers the medical aspect of fracture care, treatment of osteoporosis, measures put in place to ensure the patient will not fall again and subsequent rehabilitation to enable the client gain back his or her mobility [5].

Another component of SSC is the proposed early surgery, as the timing of fracture surgery has been identified as critical to the success of treatment in hip fractures. , delays in surgery risk increase the possibility of formation of pressure ulcers, DVT, and infection hence a high mortality. Pharmacotherapy is another primary modality of treatment in osteoporosis to halt bone loss and secondary fractures result from the disease. Bisphosphates, calcium and vitamin D are generally recommended but other advanced therapies include denosumab and anabolic agents.

Another important aspect of specific care is recovery, which includes the reestablishment of the muscle mass and movements after a

fracture.

To avoid such complications like muscle atrophy and formation of blood clot in the legs common in patients who are confined to bed early ambulation and physical therapy is important. Because most of the disabilities may be of neurological origin, rehabilitation entails programs that focus on the individual's impairment and accommodated to his or her physical status; activities such as balancing, retraining in walking, muscle strengthening to minimize prospects of future falls among other activities may form part of the program [6]. As a result of the intricateness of factors that contribute to fragility fractures, multipronged management is required to get the best results. This approach encompasses care of the actual fracture besides averting subsequent fracture episodes through the

handling of osteoporosis and measures to prevent falls. Research has demonstrated that patients who are triaged to a multimodal approach comprising surgical treatment, medication administration, and physical therapy, present improved disability and possess decreased subsequent fracture prevalence. They are both needed due to the present high demand for diversified medical services in connection with the increasing number of elderly people in the global population. Owing to aging population, there is an anticipated increased occurrence of fragility fractures, which will put pressure on the health care manpower. Because of this poor care coordination, there is a need to establish standard ways of handling fragility fractures through an integrated care pathway. These pathways can facilitate appropriate delivery of surgeries for the patients and pharmacological management for osteoporosis, apart from rehabilitation services that would aid recovery and reduce likelihood of recurrent falls [7].

The focus of this particular article is to examine the potential of geriatric orthopaedics upon the elderly population specifically for those who experience fragility fractures. It is intended to raise awareness of the need for focused intervention across health care settings aimed at this vulnerable group, and the value of the multiple modalities such as surgical, pharmacological, and rehabilitation for the treatment of osteoporotic fractures, respectively. At the same time, the article aims to shed light on the possibility of applying care integration strategies in the context of improving patients' chronic conditions and mitigating the long-term implications of fragility fractures in elderly patients. As this article makes a show of a

multisystem approach, it brings out how each health care practitioner can coordinate in ensuring the best for the at-risk client [8].

### **Materials and Methods**

The authors use a retrospective cohort control study with added features of a prospective trial to assess the results of elderly fragility fractures. However, this methodology could be modified for RCT for which the present study attempts to capture actual treatment effectiveness using both archival data and active follow-up. Retrospective cohort study is beneficial in understanding the results of given interventions in the long-term regarding the efficiency of approach to manage the fragility fractures. The study is based on retrospective analysis of records of patients aged 65 and older, who experienced osteoporotic fractures, treated in the geriatric orthopaedic department between 2015 and 2023.

The prospective part of the study involves a group of patients who will be investigated during the year after the surgery, pharmacological treatment, and rehabilitation. Retrospective as well as prospective designs facilitate the analysis of developments and associations that may have occurred over a long time period with respect to patient outcome, and also provide for ongoing systematic evaluation of the success of various intervention forms.

The target population comprises elderly patients who are 65 years old and above with fragility fractures occasioned by low energy injuries. This population also seems to mirror the current trends of circumstances that the individuals with potential osteoporosis related fractures experience, especially

among the postmenopausal women. Gender distribution results gave majority of females which is the norm in clinical investigations of OP with females contributing 70-80% of the sample population due to increased vulnerability to the disease. There are also few male patients, however, to compare the possible gender differences in the results they will be considered.

This is so because comorbidities positively influence the prognosis of fragility fractures; hence, records of patient comorbidities such as diabetes, cardiovascular diseases, arthritis, and cognitive impairment are analysed. These conditions can slow down the process of recovery and rehabilitation, and these views affect the actions of the geriatric orthopaedic teams. Due to availability of detailed information about comorbidity, the study is able to examine how the condition influences the effectiveness of surgery and the rehabilitation processes. In addition, patients' mobility, previous fractures, and existing use of medications, such possible therapies for osteoporosis as bisphosphonates, etc. are also documented to evaluate their impact on results.

Elderly patients with fragility fractures define the study population and in order to match their characteristics inclusion and exclusion criteria are set. Patient

Characteristics: The major inclusion criteria are age  $\geq$  65 years and documented osteoporosis: BMD can be T-score  $\leq$  -2.5 SD or clinical fracture history confirmed by BMD examination or previous fragility fracture. This study enrolled patients who experienced fractures as a result of low energy trauma including falls from standing, sitting or lying position. Exemplary

fracture kinds are hip, vertebral, and wrist fractures because these locations are the most frequently affected by osteoporotic fractures in the elderly [9]. People with acute high-energy trauma fractures (for example resulting from a car crash or a fall from a great height) are also excluded as those kinds of fractures are not associated with osteoporosis and would need different management. Also, patients whose normal clinical care does not involve investigations for more than a week, such as those with severe cognitive impairment or advanced dementia that might limit their ability to participate in rehabilitation, are excluded from the prospective part of the trial but may be included in the retrospective data if rehabilitation is not the primary concern. Last but not least, patients with terminal illness or other severe comorbid condition to include the patient in the study only if his/her life expectancy will be less than six months, or extremes such as weight less than 40 kg or more than 150 kg, or patients with non-orthopaedic, non-fragility fractures as well as patients with osteoporosis who are likely to live less than six months due to comorbidities

The intervention strategies evaluated in this study encompass three major components: treatment measures including surgical strategies, drugs and therapies, and rehabilitative methods. The aim is to identify potential changes in the results of treatment in patients with a combination of these MDTs on fracture union, limb function and mobility, general health status and reducing potential for subsequent fracture(s). Majority of patients with fragility fractures, however, need surgery, especially for hip and vertebral fractures. Some of the surgeries

discussed in this study are internal fixation, hemiarthroplasty, and total hip arthroplasty on hip fractures. While internal fixation is applied mostly with relatively minor fractures to the area, hemiarthroplasty or total hip replacement is utilized in severe fractures affecting the joint. Vertebroplasty and kyphoplasty are indicated in spinal fractures to improve the strength of the fractured vertebrae and reduce pain.

Surgical interventions are categorised according to the type of procedure, fixation method and time of surgical intervention. Surgery is the most important procedure variable since delayed surgeries are linked with unfavourable consequences. Data on intra- and postoperative complications, including infections, hardware failure or need for revision surgeries, is collected to look at how these affect the patient's recovery and overall long-term course. Further, the experience of a surgical team is considered as well as geriatric orthopaedic surgeons are more likely to provide a higher success rate.

Pharmacological intervention is indispensable in both prevention and treatment of osteoporosis in patients presenting with fragility fractures. This paper reviews the management on osteoporosis by focusing on bisphosphonates; alendronate and risedronate which are the recommended treatments for bone resorption. It includes patients' compliance with recommended medications for osteoporosis and the efficiency of such preparations in preventing new fractures [10].

Besides, Bisphosphonates, calcium and vitamin D are other medications that are usually prescribed to patients. The patient compliance with these

supplements, and effects on their bone mineral density and fracture risk is discussed in this paper. Therefore, for high risk patients newer options of pharmacotherapy such as agents that inhibit bone resorption, denosumab, and agents that build bone mass, such as teriparatide are prescribed. Regarding these drugs, the ability to inhibit the second fractures and the increase in bone density enumerated by their relative cost, side effects and patient compliance.

The human mobility; strength training; balance exercises; gait retraining, and safe knowledge and practices programs of physical therapy and their impacts on the subject's mobility disability and the opportunities to avoid or diminish a future fall are now assessed. The study also considers the prescription of walking aids like walkers, and canes in order to boost the patient independency during the recovery phase. Measures undertaken at home including handrails, special facilities in the bathroom, absence of fall risks are discussed on the potential of reducing the risk for future falls and fractures.

The Clinical Rehabilitation Measures of this study consists of Common Clinical Measures, functional dependencies and Mortality Index. These are assessed at the fracture stage (baseline), 6 and 12 months after the fracture in order to identify both short-term and long-term recovery.

The major clinical endpoints are the rates of fracture healing, time to fully laden weight-bearing ability and the propensity for re-fracture. Healing times are monitored to determine what course of action (surgical, pharmacological and/or rehabilitation) affects the biological process of the fracture healing. Furthermore, re-fracture rates are also significant for

describing osteoporosis treatment because pharmacotherapy should decrease the risks of fractures in patients. Pain intensity is which is also measured using standard instruments like Visual Analog Scale (VAS) to compare the efficacy of surgical and/or medical treatments in relieving pain.

There are often concerns with the patient's mobility, their ability to be independent, and in general their quality of living. Ambulation is also examined by giving the patient certain timed tasks for example, in the Timed Up and Gos (TUG) test to check on the speed at which the patient is likely to have independent mobility again. The activities of daily living are assessed by the Barthel Scale where one assess the amount and level of difficulty of an individual in activities such as bathing, dressing and feeding. The last is Quality of life as fabricated by the Spe-metric standard such as the Short Form Health Survey (SF-36) or the EQ-5D physical, emotional and social well being. Rehabilitation effectiveness can be measured by issues such as functional independence and quality of life.

The progression of these fragility fractures to complications or death is monitored by means of mortality rates in order to establish the risk levels inherent in such fractures, particularly hip fracture. Complication rates are also followed in the study; surgical complications, which are infections or the failure of the hardware implanted, and medical complications such as deep vein thrombosis or pneumonia that may develop after the surgery.

From this reflexive comparative assessment of clinical, functional, and mortality data, we derive practical lessons about managing fragility fractures

and underscore the value of a multimodal, surgical, pharmacological, and rehabilitation strategy for elderly patients [11].

## **Results**

A common finding was that the healing and functional recovery rates differed markedly depending on the type of surgical procedures used in the study. In the patients by direct internal fixation, the recovery time was in the range of 10-12 weeks depending on the extent of the surgery like THA which took 12-14 weeks. That is, patients in the early surgery group, who underwent surgery within 48 hours of the fracture, had a faster recovery, less complications, and better functional outcome compared with the delay surgery group. Mobility status was evaluated with regard to the patient's ability to regain functional level after surgery and 70% of patients with THA gained ability to walk without assistance within six months, while internal fixation group regained such ability only in 50% of cases.

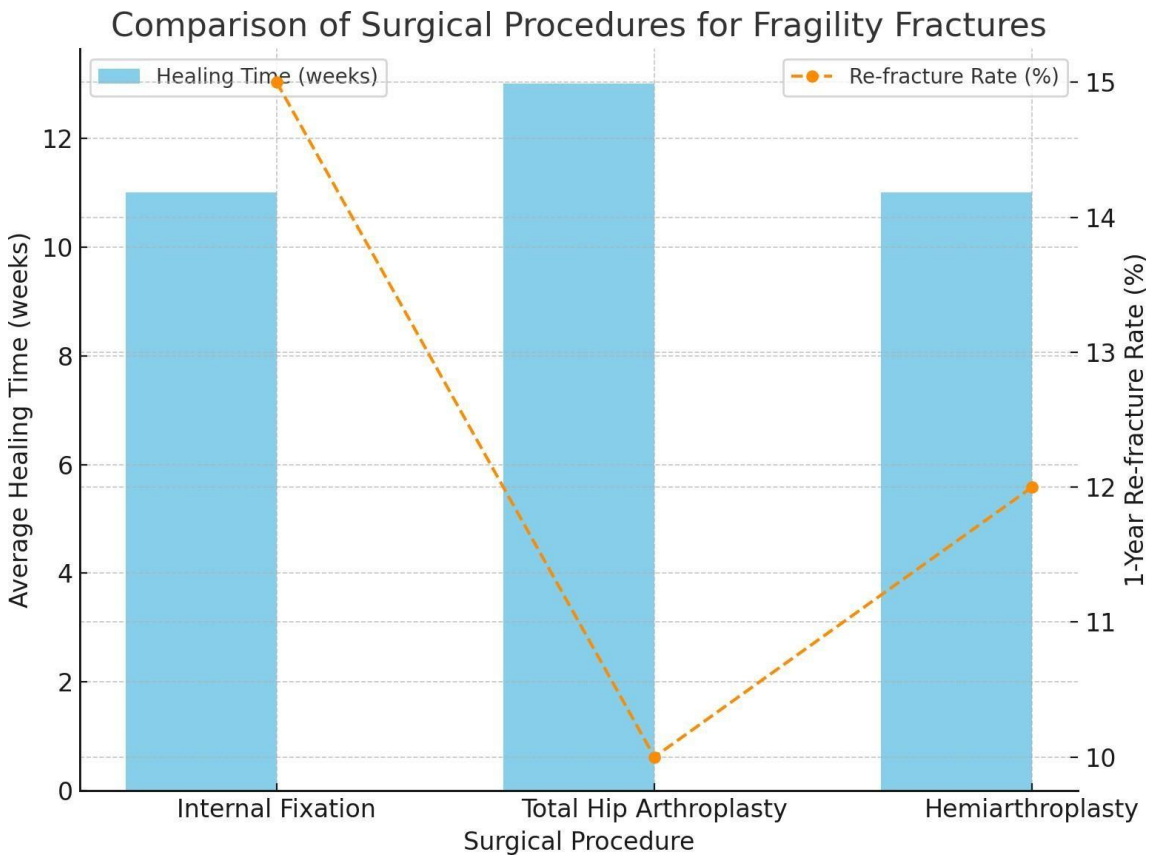
Re-fracture rates were significantly lower in patients who underwent early surgery in addition to pharmacological treatment for osteoporosis. That means fresh fracture took places in under 10% of the THA group of patients within one year of the surgery while patients who were treated using internal fixation slightly bit higher re-fracture rate of 15%. Three patients in the internal fixation group developed surgical complications such as infections compared to THA group who had one point five percent complications. The 30-day mortality rate of the patients also differed according to the nature of the surgery; 5% in the THA group and 8% in the

internal fixation group. Higher mortality in the longer term of 300 days was observed

among patients with comorbidities who undergone surgery later [12].

**Table 1: Surgical Outcomes**

Surgical Procedure	Average Healing Time (weeks)	1-Year Re-fracture Rate (%)
Internal Fixation	10-12	15
Total Hip Arthroplasty	12-14	10
Hemiarthroplasty	10-12	12



Drug therapy included the use of bisphosphonates and the use of calcium and vitamin D supplementation, both of which appeared to reduce future fracture risk. Manipulation of bisphosphonate therapy, especially alendronate or risedronate, substantially reduced fracture rate recurrence by 30-40% over one year. The other more advanced pharmacological therapy was denosumab, for which the patient's risk of subsequent fractures diminished even further, to as low as 50% if they did not undergo pharmacotherapy.

got to experience further fractures. Compliance was reported to be low due to side effects like Gastrointestinal upset effects hence need to enlist patients support to enhance their compliance.

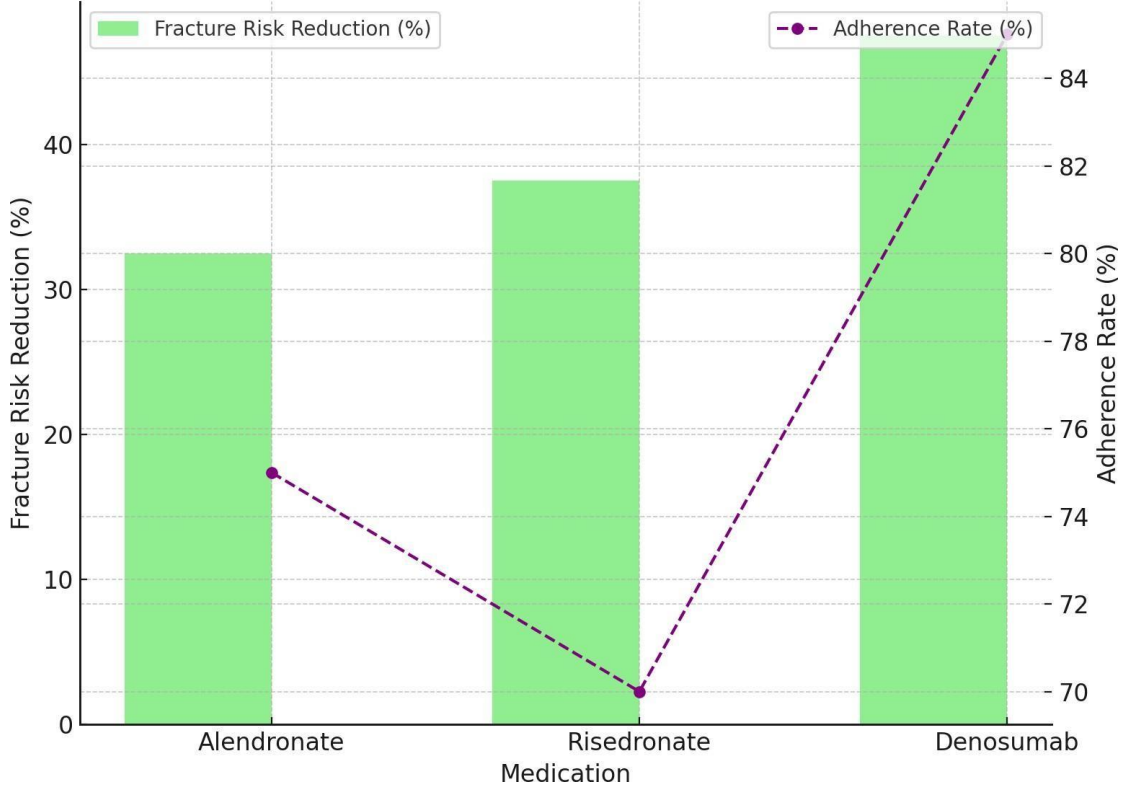
Compliance with osteoporosis medication was identified as an essential predictor of patient outcomes. Archive data revealed that adult vertebral fracture patients who abided the medication regimen closely enjoyed significantly less re-fracture incidence, higher bone mineral density (BMD), and superior quality of life. Thus, of the 250 **Table 2: Impact of Pharmacotherapy**

Medication	Fracture Risk Reduction (%)	Adherence Rate (%)
Alendronate	30-35%	75%
Risedronate	35-40%	70%
Denosumab	45-50%	85%

patients examined, 80 percent of patients who took bisphosphonate did not have another fracture in the subsequent year. However, 40% of the patients who did not follow medication or stopped treatment early

especially in patients who have had hip fracture

### Comparison of Medications for Osteoporosis Treatment



Rehabilitation, especially when started early in the patient’s stay, was deemed to have been very important and filled the gap of enhancing the mobility, self independence and quality of the patient’s life. In the recently completed prospective study, early implementation of physical therapy, within the first 48 hours post-surgery, was associated with better postoperative physical functioning than if physical therapy was initiated later. It has been identified that early mobilisation entitled a faster recovery of the independent mobility by 25 percent,

surgery. Having physical therapy from the perspective of long term, including strength exercise, balance exercise, and gait exercises helped them maintain an improved mobility status and lowered the probability of another fall in the future.

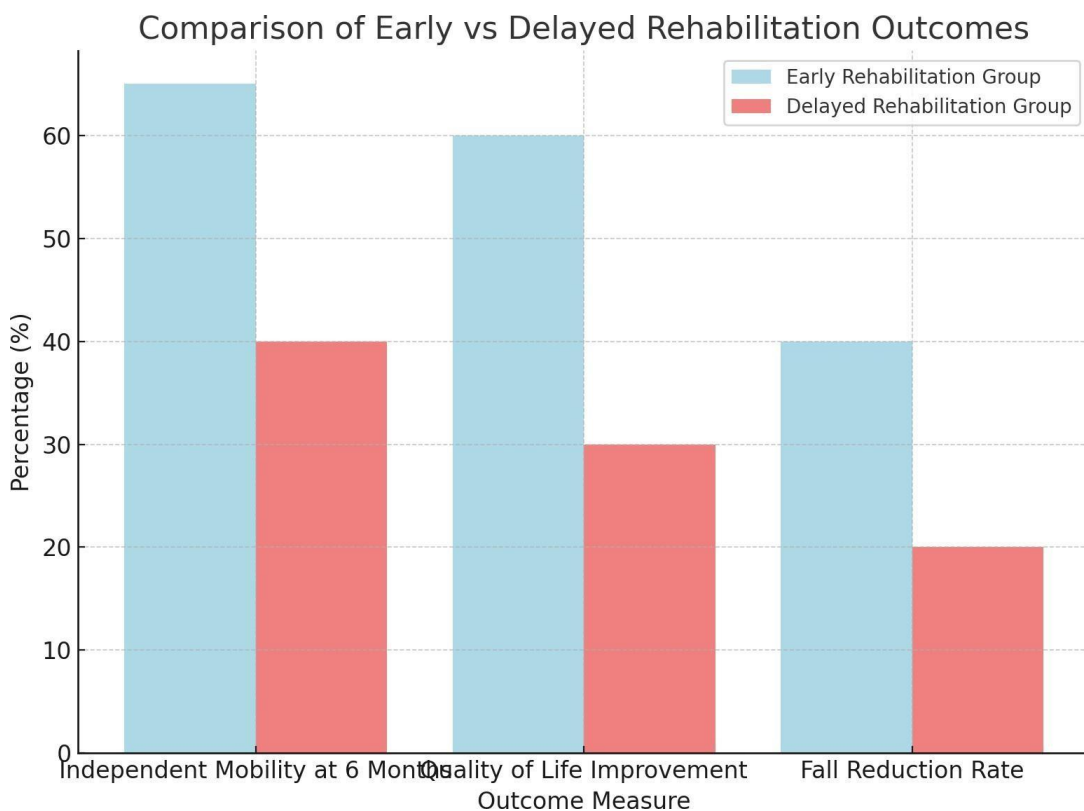
Mobility changes were quantified by testing the subjects by the standard tests, such as the TUG and the BI. Symptom improvement among patients who were discharged after structured rehabilitation programmes showed that 65% of the patients were fully mobile after completing the six-month rehabilitation programme as compared to 40%

Outcome Measure	Early Rehabilitation Group	Delayed Rehabilitation Group
Independent Mobility at 6 Months (%)	65%	40%
Quality of Life Improvement (%)	60%	30%
Fall Reduction Rate (%)	40%	20%

of the patient population who did not

go for regular therapy. Analysis of the Barthel Index revealed the patients who experienced consistent rehabilitation became independent. Beneficial effects on quality of life were also noticed in the patients questioned by means of EQ-5D questionnaire – improved physical and emotional health were revealed. Rehabilitation not only improved the physical functioning but also decreased the psychological morbidity in case of fragility fractures which are common with this group of patients [13].

orthopaedic surgeon, endocrines, physical therapist or any other member of the interdisciplinary team did significantly better across all variables analysed than did patients who saw an individual practitioner or only received PT. Integrated care outcome included shorter days to mobilisation, lower re-fracture rates, and the overall quality of life. Mobility of patients in the multimodal group was 20% better and the re-fracture rate 15% lower than in patients treated by single-modality treatment.



Cross-sectional and single-modality studies also showed statistically significant differences in outcomes between patients treated with integrated multidisciplinary care and other patients. Specifically, patients in the study who saw a geriatrician,

Schizophrenia patients were also diagnosed and treated for osteoporosis early in their multi specialty clinic visits. The authors found that patients who have been receiving surgical treatments in combination with pharmacological treatments in a combined treatment strategy had lower rates of subsequent fractures. Also, when incorporated within the holistic

treatment approach, Rehabilitation Services offered the best results towards regaining the patient's self-reliance and reduction of future falls. Superimposed comorbidity had the most significant outcomes on exhaustive coordinated care and the association between the broken bone healing, and general health outcomes [14].

Therefore, the general effectiveness of the multidisciplinary strategies is supportive of the commitment to shared care strategies in handling fragility fractures in the elderly population. This study underlines the importance of implementing effective care pathways in order to integrate surgery, pharmacological therapy and rehabilitation within health care organizations. These models of care not only promote desirable patient outcomes but also increase the optimum future wellbeing of elderly patients. Summing up, this work proves that the following therapeutic strategy is effective for elderly individuals with fragility fractures: operative treatment, medication, and rehabilitation. Early intervention, strict compliance with osteoporosis treatment and repetitive rehabilitation schedules exhibited decreased re-fracture rates, increased general mobility and better quality of life. These results confirm that care models are required in geriatric orthopaedics, especially with regards to osteoporotic fractures.

### **Discussion**

The findings of this paper re-emphasise the essence of the integrated model of health care delivery in the proper management of fragility fractures in ageing population. An active form of treatment that includes

surgical, medical, and rehabilitation workup results in much superior outcomes compared to the use of individual treatment utilizing only one of the mentioned modes of intervention. Every activity addresses a specific concern in the patient's care plan and all the components of the treatment plan are interrelated and integrated to calibrate a plane of comprehensive Elderly with

Osteoporosis and Fracture Intervention Plan. The major advantage of the combined surgical, pharmacological, and rehabilitation approach is that it allows a fracture management alongside the prevention of recurrent falls and subsequent fractures. Orthoses implication in fracture healing is significant in those abnormal areas like the hip and spine where the fracture requires surgical control to avoid increased pain, immobility and further loosening.

Nevertheless, the surgery is not enough to avoid consecutive breakages, especially if the patient had osteoporosis. Pharmacotherapy, particularly with bisphosphonates or newer classes of drugs such as denosumab, becomes important to increase bone mass, decrease future fractures, and increase BMD. The role of rehabilitation especially when it begins with the onset of the disease is also unreplaceable. Rehabilitation also involves regaining functional independence to the body, assessment for increases in fall risk which is a major reason for fractures in elderly [15].

The values of this multidisciplinary strategy were reflected in shorter time to rehabilitation, better mobilization, lower rates of re-fracture, and better overall functioning of the participants of integrated

care. Rehabilitation involving early mobilization with or without pharmacotherapy to enhance bone density contributes to definitive rehabilitation. The approach of the care delivery matching the client's individual health condition and type of the fracture is crucial and should be individual for the elder population. In addition, care models addressing fragility fracture decrease common consequences including depression and anxiety due to prolonged immobility and loss of autonomy. Per'S Approaches, Assessing the Importance of Early Intervention and Developing a

#### Personalized Treatment Plan

Timing of intervention is an independent predictor of recovery among the frailty injured elderly population who develop fragility fractures. Research has revealed that if surgery is to be performed, it is best done within the first 48 hours of the injury and that doing so results in better functional results and fewer complications. Surgery postponement makes patients vulnerable to develop risks including deep vein thrombosis, infections and mortality. Since early intervention means that patients can start their rehabilitation at once it helps a lot to regain mobility and be independent. This study brings back our message that early surgical intervention is key to delivering the best results in elderly people with fragility fractures.

Besides, early intervention, the defining characteristic of stroke management is the development of individualized treatment regimens based on the patients' clinical characteristics. Old patients are likely to suffer from multiple pathology such as cardiac diseases, diabetes, and on occasion, dementia making

the process of their work up challenging. A coordinated management plan focusing on the fracture and the osteoporosis and other comorbid states gives the patient a better long-term management program. For example, patients at higher risk of fracture may get superior pharmacological treatment, such as denosumab, while patients with balance problems will need more rigorous falls preventative programs [16]. Personalised care also applies to the rehabilitation stage conducted in recognition of the patient's disability, with treatment profiles having to reflect the patient's physical capacity and, mobility prognosis. Individualized rehabilitation needs which may involve balance, strength and gait training and retraining enable patients to get a better functional outcome. Secondly, pharmacotherapy regimens based on patient adherence to instructions and possible effects should also be considered for the prevention of further fractures.

Multidisciplinary care seems incontestable; however, several barriers prevent it from becoming a day-to-day reality. Hence, one of the main challenges is to have an efficient link between various units of the healthcare team members. Geriatric orthopaedic care involves multiple disciplines such as surgery, endocrinology, geriatric medicine and physiotherapy which is spatially complex in many healthcare organizations. Inadequate continuity of care means that majority of patients receive care from different care providers and do not benefit from integrated care delivery systems. There is need to extend co-ordination between the doctors, most importantly in sharing information regarding tools that should be

used in treatment of fragility fractures through setting up of standardized procedure.

Another massive problem is the inadequacy of resources for use in problem-solving. The different in depth requires time and expenditure on personnel, on rehabilitation facilities, and on pharmacological therapies which might be expensive. In most health care practices, especially those with little resource envelope with which to operate, unified management of all patients presenting with fragility fractures may not be possible. Based on that, such cost-effective solutions as identification of high risk patients for subsequent intensive management might help to prevent some of these issues [17].

Continued failure of patients to adhere to treatment regimens especially in pharmacological management, is still another major concern. Common side effects related to the use of osteoporosis medications include gastrointestinal disturbances, pain, and some constitutional symptoms, meaning that elderly patients may stop treatment. Such failures include nonadherers, nonadherence to bisphosphonates which are one of the leading causes of fractures. The steps to take to counter the issue include halting the barriers to adherence like explaining to patients they necessarily have to continue with treatment regardless of the side effects they may experience or using other treatment forms that will not cause many adverse effects on their body. The current study also has limitations that were found to be relevant: However, the size of the sample is adequate for the investigation of broad patterns where certain details of variability in patient experience by demographic characteristics or presence of the comorbidities might

remain unnoticed. However, a larger and more diverse sample would also make it possible to obtain a more complex view of what determines recovery. Furthermore, the follow-up time used in this study was sufficient for short to middle-term outcome; however, it might have been insufficient in assessing the long-term benefit of multidisciplinary care particularly with regard to fracture recurrence and quality of life. The subsequent investigations should try to increase the duration of follow up, so as to get data on the long-term consequences of those restoration methods. Based on the results of the current study, several research directions and opportunities for development in the field of geriatric orthopaedics are discussed below. Among the spheres that may be explored, it is possible to identify the prospects for creating new approaches to the operations performed, with the minimal required recovery periods and lower levels of associated complications. Novel techniques of minimally invasive surgery, especially in hip and vertebral surgeries that could result in early rehabilitation and reduced hospital stay may have potential to boost the functional results and decrease the health care cost. Also, historical uses of computer Assistance surgery and the incorporation of robotics may improve the quality of fracture fixes, providing superior long-term outcomes. Pharmacological developments also offer a lot of promise for enhancing the care of osteoporosis and minimizing fracturing. New molecules that promoted osteogenesis or dual mode of action drugs that inhibit bone remodelling and promote bone deposition are thus likely to be preferable for high-risk

patients. Additionally, optimizing osteoporosis treatment, for instance, using efficient easily administrable long-acting injectables may improve patients' compliance and lower the risk of fractures. Another area of potential future research is the specialized rehabilitation programs with focuses on elderly patients with complication comorbidities. Altogether, by establishing more rehabilitation programs, which inculcate both the physical and cognitive exercises, might go along way to helping the patient with cognitive losses regain their independence and/or some form of it. Additionally, more sophisticated forms of rehabilitation like remote monitoring and tele-rehabilitation, will increase the number of patients who can access rehabilitation following discharge by increasing geographical access to rehabilitation services.

Future work can also focus on deeper analysis of the costs for the organization of multidisciplinary care. Though, integrated care models are acknowledged to enhance patient care, their financial appropriateness as applied to the spectrum of healthcare environments is still questionable. More specific, there is rising interest in the cost- effectiveness of the management of fragility fractures with a multidisciplinary approach, especially in LMICs, in order to inform healthcare policy and resource mobilization. Thus, the findings of the present study call for a multimodal modality in the treatment of fragility fractures in elderly patients. Surgical management combined with pharmacotherapy and rehabilitation not only generate favourable clinical indications, but also can increase quality of life, as well as to prevent re-fractures. Yet it is quite evident that

defining such an approach to the process of providing patients with the optimal course of actions to be taken based on the diagnosis offers numerous advantages such as the use of personalized treatment plans backed with a coordinated care. Further studies are required to optimize these treatments, understand the issues that reduce access to care, and advance the knowledge of surgical, drug, and physical therapies to enhance results in this high-risk group [18].

### **Conclusion**

Overall, this paper underscores the point that when employed, a combined model of surgical management, medical treatment, and physical therapy does enhance clinical and functional recovery processes in the elderly populace with osteoporotic fragility fractures. The benefits of such approaches include shortening of recovery period and reducing of re-fracture rates, increase of mobility and the quality of life. The study results highlight an important need for further development of the geriatric orthopaedics, where focused on proper surgical intervention, treatment of osteoporosis, and individual rehabilitation approach is crucial. In clinical practice, it underlines the scenario that special healthcare systems should apply comprehensive medical paradigm that involves different doctors responsible for elderly patient's proper treatment in the case of fragility fractures. These models should be automated to promote efficient recovery, reduce the possibilities of future fractures among the ill-health-group, and achieve better lifelong stock among this group.

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