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Contemporary Orthogeriatric Care for Fragility Fractures: Advancing Functional Recovery and Multidisciplinary Management in Older Adults

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ABSTRACT

Fragility fractures have become one of the most significant health challenges associated with global population aging, generating substantial consequences for functional independence, healthcare systems, and quality of life. This review aimed to analyze the current scientific evidence regarding the epidemiology, pathophysiology, risk factors, modern orthogeriatric management, and functional recovery of older adults sustaining fragility fractures. A structured literature review was conducted using international scientific databases and evidence-based clinical guidelines published by recognized organizations. The available evidence demonstrates that fragility fractures are multifactorial conditions resulting from the interaction of osteoporosis,

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sarcopenia, frailty syndrome, multimorbidity, nutritional deficits, and age-related physiological decline. Contemporary orthogeriatric care, based on multidisciplinary collaboration, Comprehensive Geriatric Assessment, timely surgical management, individualized rehabilitation, nutritional optimization, osteoporosis treatment, and secondary fracture prevention, consistently improves mobility, functional independence, postoperative outcomes, and long-term quality of life. Early rehabilitation and coordinated follow-up through structured fracture prevention programs were also associated with lower complication rates and reduced risk of recurrent fractures. Furthermore, the findings emphasize the growing importance of integrating orthopedic surgery, geriatrics, rehabilitation medicine, nutrition, and preventive care into patient-centered management strategies. As demographic aging continues to accelerate worldwide, particularly in Latin America, strengthening orthogeriatric services and implementing evidence-based multidisciplinary models represent essential strategies for preserving autonomy, reducing disability, and improving long-term clinical outcomes among older adults with fragility fractures.

KEYWORDS

Fragility fractures, Orthogeriatrics, Older adults, Functional recovery, Hip fracture, Osteoporosis, Sarcopenia, Frailty, Rehabilitation, Secondary fracture prevention.

INTRODUCTION

Population aging has emerged as one of the most significant demographic transformations of the twenty-first century, fundamentally reshaping healthcare systems worldwide. Improvements in life expectancy, advances in chronic disease management, and declining fertility rates have contributed to an unprecedented increase in the proportion of older adults, particularly those aged 65 years and older. While this demographic transition reflects remarkable progress in public health, it has also generated substantial challenges related to age-associated conditions, among which fragility fractures represent one of the leading causes of disability, institutionalization, healthcare expenditure, and premature mortality. Unlike high-energy traumatic injuries, fragility fractures occur after minimal trauma, such as falls from standing height, and are closely associated with osteoporosis, sarcopenia, frailty syndrome, and multiple chronic comorbidities that compromise physiological reserve and functional independence [2], [3], [17].

Fragility fractures have progressively become a major global public health concern due to their increasing incidence and their profound consequences on quality of life. Hip fractures, vertebral compression fractures, proximal humerus fractures, pelvic insufficiency fractures, and distal radius fractures constitute the most frequent clinical presentations among older adults. Hip fractures deserve particular attention because they are associated with mortality rates approaching 20–30% during the first postoperative year, while a considerable proportion of survivors never regain their previous level of independence. Furthermore, many patients require long-term institutional care following hospitalization, imposing substantial socioeconomic burdens on families and healthcare systems across both developed and developing countries [1], [2], [11].

The biological mechanisms underlying fragility fractures are considerably more complex than isolated reductions in bone mineral density. Contemporary evidence demonstrates that aging simultaneously affects multiple physiological systems, including skeletal integrity, muscle mass, neuromuscular coordination, endocrine regulation, immune function, nutritional status, and cognitive performance. Consequently, osteoporosis alone no longer adequately explains fracture susceptibility. The interaction between osteopenia, sarcopenia, chronic inflammation, impaired balance, frailty syndrome, multimorbidity, and recurrent falls creates a multifactorial clinical scenario requiring comprehensive assessment rather than isolated orthopedic management [3], [13], [17].

Frailty syndrome has gained increasing recognition as one of the strongest predictors of adverse outcomes following osteoporotic fractures. Frail individuals demonstrate diminished physiological reserve, impaired stress response, increased vulnerability to acute illness, prolonged hospitalization, higher rates of postoperative complications, and delayed functional recovery. In clinical practice, frailty frequently coexists with cognitive impairment, malnutrition, polypharmacy, cardiovascular disease, diabetes mellitus, chronic kidney disease, and reduced mobility, further increasing perioperative risk. Consequently, chronological age alone has become an insufficient predictor of prognosis,

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whereas biological age and multidimensional geriatric assessment have emerged as more reliable determinants of clinical outcomes [6], [10], [17].

Historically, the management of fragility fractures was predominantly centered on surgical repair performed by orthopedic surgeons, with postoperative rehabilitation initiated after stabilization of the fracture. Although this traditional approach successfully addressed mechanical bone stabilization, it often neglected the numerous geriatric syndromes that substantially influence recovery. High rates of delirium, infections, pressure injuries, thromboembolic complications, nutritional deterioration, muscle wasting, prolonged immobility, and recurrent falls highlighted the limitations of isolated orthopedic care, prompting the development of integrated orthogeriatric models during the last two decades [4], [6], [14].

Orthogeriatric care represents one of the most important paradigm shifts in contemporary fracture management. Rather than treating the fracture as an isolated orthopedic event, this model considers fragility fractures as manifestations of systemic aging and emphasizes coordinated multidisciplinary care involving orthopedic surgeons, geriatricians, anesthesiologists, rehabilitation physicians, nurses, physiotherapists, occupational therapists, nutritionists, pharmacists, psychologists, and social workers. The integration of these professionals aims not only to optimize surgical treatment but also to reduce perioperative complications, accelerate mobilization, preserve functional independence, prevent secondary fractures, and improve long-term quality of life [4], [7], [10].

Several large clinical studies have demonstrated that multidisciplinary orthogeriatric programs significantly reduce hospital length of stay, postoperative complications, mortality, institutionalization rates, and healthcare costs while improving functional outcomes and patient satisfaction. Early Comprehensive Geriatric Assessment (CGA), optimization of chronic diseases before surgery, standardized pain management protocols, prompt surgical intervention, early mobilization, nutritional support, osteoporosis treatment, and individualized rehabilitation programs have consistently been associated with superior clinical outcomes compared with conventional orthopedic care alone [4], [7], [8], [14].

One of the most influential advances in fragility fracture management has been the widespread implementation of Fracture Liaison Services (FLS). These coordinated care pathways were specifically designed to identify patients sustaining fragility fractures, investigate underlying osteoporosis, initiate evidence-based anti-osteoporotic treatment, educate patients regarding fracture prevention, and ensure long-term follow-up after hospital discharge. International organizations such as the International Osteoporosis Foundation have strongly promoted FLS programs due to their proven effectiveness in reducing secondary fractures, improving treatment adherence, and optimizing healthcare resource utilization [16], [20].

The burden of fragility fractures is particularly relevant for Latin America, where rapid demographic aging is occurring alongside considerable heterogeneity in healthcare infrastructure, socioeconomic conditions, and access to specialized geriatric services. Countries throughout the region are experiencing substantial increases in osteoporosis prevalence and hip fracture incidence while simultaneously facing limitations in multidisciplinary rehabilitation programs, fracture prevention strategies, and post-acute care resources. Consequently, strengthening orthogeriatric services has become an important priority for improving healthy aging across Latin American healthcare systems [18].

Recent international clinical guidelines increasingly emphasize that successful fracture management extends beyond surgical fixation. Functional recovery has become the principal therapeutic endpoint, incorporating preservation of autonomy, restoration of mobility, reintegration into community life, reduction of disability, and prevention of recurrent fractures. Contemporary rehabilitation strategies emphasize early weight-bearing, individualized exercise prescription, progressive resistance training, balance rehabilitation, nutritional optimization, adequate protein intake, vitamin D supplementation, cognitive support, and fall prevention interventions, reflecting a holistic approach to recovery rather than solely radiographic healing [8], [9], [15].

Technological innovation has further expanded opportunities for optimizing orthogeriatric care. Artificial intelligence-based risk prediction models, wearable technologies capable of monitoring gait instability, tele-rehabilitation platforms, robotic-assisted rehabilitation devices, advanced imaging modalities, and digital clinical decision-support systems are increasingly being incorporated into routine clinical practice. Although many of these innovations remain

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under continuous evaluation, they demonstrate considerable potential for improving individualized care pathways, enhancing functional recovery, and reducing healthcare disparities among older adults [14], [16].

Despite substantial progress achieved during recent decades, important knowledge gaps persist regarding the optimal integration of surgical treatment, comprehensive geriatric assessment, rehabilitation timing, nutritional interventions, pharmacological osteoporosis management, and long-term functional follow-up. Variability in healthcare organization, differences in clinical protocols, resource availability, and patient characteristics continue to influence treatment outcomes worldwide. Therefore, continuous synthesis of emerging evidence remains essential for guiding evidence-based clinical practice and supporting multidisciplinary decision-making across diverse healthcare settings [3], [7], [15].

Accordingly, the present review aims to comprehensively examine the current scientific evidence regarding frailty fractures in older adults, with particular emphasis on modern orthogeriatric management and functional recovery. The review integrates recent international literature addressing epidemiology, pathophysiology, risk factors, multidisciplinary care models, perioperative optimization, surgical management, rehabilitation strategies, osteoporosis treatment, secondary fracture prevention, technological innovations, and future perspectives. By synthesizing contemporary evidence from multiple disciplines, this review seeks to provide healthcare professionals, researchers, and medical students with an updated understanding of the evolving orthogeriatric approach that promotes healthier aging, improved functional independence, and better long-term outcomes among older patients experiencing fragility fractures.

DEVELOPMENT

Fragility fractures in older adults constitute a complex geriatric condition rather than an isolated traumatic event. They commonly occur after low-energy mechanisms, particularly falls from standing height, in individuals whose skeletal resistance and physiological reserve have been progressively reduced by aging, osteoporosis, sarcopenia, chronic disease, nutritional deficiencies, and functional impairment. Although the hip, vertebrae, distal radius, proximal humerus, and pelvis are the most frequently affected anatomical sites, hip fractures generate the greatest clinical concern because of their close association with hospitalization, loss of mobility, dependence in activities of daily living, institutionalization, and premature mortality [2], [3].

The probability of sustaining a fragility fracture cannot be explained exclusively by bone mineral density. Bone quality, cortical porosity, trabecular deterioration, muscle strength, balance, gait stability, visual capacity, cognitive status, medication use, and environmental conditions interact to determine the final risk. This explains why fractures may occur in patients without densitometric osteoporosis and why preventive strategies based only on pharmacological treatment of bone loss may be insufficient. A comprehensive approach must evaluate both skeletal vulnerability and the factors that increase exposure to falls [3], [13], [20].

Frailty is especially relevant because it reflects a reduction in the capacity to maintain physiological stability when an older person is exposed to an acute stressor. A fracture, anesthesia, surgical intervention, hospitalization, pain, and bed rest may therefore produce a disproportionate deterioration in frail patients. The consequences can include delirium, acute functional decline, infections, pressure injuries, malnutrition, thromboembolic events, worsening of pre-existing diseases, and prolonged dependence. For this reason, chronological age should not be used as the only indicator of risk; functional status, cognition, nutritional condition, comorbidity burden, mobility, social support, and previous level of independence provide more useful information for clinical decision-making [6], [10], [17].

Sarcopenia further intensifies the relationship between fragility and fracture. Reduced muscle mass and strength compromise postural control and the ability to respond rapidly to instability, increasing the likelihood of falling. After the fracture, pain, inflammatory stress, insufficient protein intake, and immobility accelerate muscle loss, creating a cycle in which weakness delays mobilization and delayed mobilization produces greater weakness. Consequently, the preservation or recovery of muscle function must be regarded as a central component of treatment rather than a secondary rehabilitation objective.

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Traditional fracture care has primarily focused on radiographic diagnosis, surgical fixation, and postoperative surveillance. While achieving mechanical stability remains essential, this model does not fully address the multidimensional needs of older patients. Surgical success does not necessarily result in functional recovery when delirium, fear of falling, cognitive impairment, uncontrolled pain, depression, malnutrition, or inadequate social support remain untreated. Modern orthogeriatric care therefore combines orthopedic treatment with comprehensive geriatric assessment and coordinated interdisciplinary interventions [4], [7].

The orthogeriatric model involves shared and continuous decision-making between orthopedic surgeons and geriatric specialists, supported by anesthesiology, rehabilitation medicine, nursing, physiotherapy, occupational therapy, nutrition, pharmacy, and social work. Its purpose is to optimize the patient before surgery without introducing avoidable delays, prevent perioperative complications, facilitate early mobilization, and plan continuity of care from admission to community reintegration. Randomized and observational studies have associated comprehensive geriatric care with improved mobility, fewer complications, reduced institutionalization, and better functional outcomes compared with conventional orthopedic management [4], [5], [7]. Systematic evidence has also linked orthogeriatric collaboration with reductions in hospital and long-term mortality.

Timely surgery represents one of the fundamental components of this approach. Unnecessary postponement prolongs pain, fasting, immobilization, sleep disturbance, and exposure to the hospital environment. These factors may contribute to delirium, respiratory complications, thromboembolism, pressure injuries, and muscular deterioration. Nevertheless, early surgery should not be interpreted as proceeding without clinical assessment. Reversible conditions that significantly increase operative risk—such as hemodynamic instability, severe electrolyte imbalance, uncontrolled infection, acute cardiac decompensation, or clinically important anemia—must be addressed promptly through standardized protocols. Current orthopedic guidance supports organized pathways that avoid preventable delays while ensuring adequate perioperative optimization [1], [9].

Pain management is another determinant of recovery. Insufficient analgesia limits deep breathing, transfers, sitting, standing, and participation in therapy, while excessive sedation may worsen confusion, respiratory function, and fall risk. Multimodal analgesia, adjusted to renal function, comorbidities, cognition, and previous medication exposure, can reduce these problems. Regional anesthesia techniques may be useful in selected patients by providing effective analgesia and decreasing systemic opioid requirements. Pain should be assessed repeatedly because older patients with cognitive impairment may express it through agitation, withdrawal, resistance to movement, or changes in behavior rather than through direct verbal reporting.

Functional rehabilitation should begin as soon as clinical and surgical stability permit. Early sitting, transfers, standing, weight-bearing, and gait training help limit the effects of immobilization and support the recovery of autonomy. Rehabilitation must be individualized according to fracture type, surgical procedure, pre-fracture mobility, cognitive status, balance, muscle strength, and rehabilitation potential. Its objectives should include not only walking distance but also the ability to perform activities such as rising from a chair, using the bathroom, dressing, climbing steps, and moving safely within the home [8], [11]. Early mobilization has been associated with fewer postoperative complications, faster recovery of walking capacity, and shorter hospitalization.

Nutritional management is closely related to functional prognosis. Protein-energy malnutrition is common among hospitalized older adults and may be present before the fracture or develop during admission. Pain, fasting, swallowing difficulties, cognitive impairment, depression, inflammation, and dependence during feeding can reduce intake. Nutritional screening should therefore be performed early, followed by individualized interventions that ensure adequate energy, protein, calcium, and vitamin D intake. In patients with sarcopenia or malnutrition, nutritional support should be combined with progressive resistance and balance exercises, since supplementation without muscular stimulation may have a limited functional effect.

The prevention of delirium must also be integrated into routine care. Hip fracture patients frequently present several predisposing factors, including advanced age, dementia, sensory impairment, dehydration, polypharmacy, sleep disruption, infection, pain, and metabolic alterations. Preventive strategies include adequate analgesia, orientation, access to glasses and hearing devices, hydration, sleep protection, avoidance of unnecessary urinary catheters, medication review, early mobilization, and family involvement. Delirium should not be considered an inevitable

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consequence of aging because it is associated with prolonged hospitalization, functional deterioration, institutionalization, and increased mortality.

Following the acute phase, secondary fracture prevention becomes essential. A first fragility fracture is a major predictor of subsequent fractures, particularly during the period immediately following the initial event. However, many patients leave the healthcare system without assessment or treatment of osteoporosis. Fracture Liaison Services were developed to close this gap through systematic patient identification, fracture-risk assessment, investigation of secondary causes, initiation of pharmacological treatment, education, monitoring of adherence, and coordination with primary care [16], [20]. These services represent a structured connection between acute fracture treatment and long-term prevention. (

Pharmacological management should be selected according to fracture risk, renal function, previous treatment, life expectancy, adherence capacity, and contraindications. Bisphosphonates and denosumab remain widely used antiresorptive alternatives, while bone-forming therapies may be considered in patients with very high fracture risk, multiple vertebral fractures, or failure of previous treatment. Nevertheless, medication should be integrated with fall prevention, physical activity, nutritional support, visual correction, environmental adaptation, and review of drugs associated with dizziness, hypotension, sedation, or impaired balance [3], [15], [20].

The Latin American context requires particular consideration. Rapid population aging is occurring alongside unequal access to osteoporosis diagnosis, geriatric consultation, timely surgery, rehabilitation services, and post-fracture monitoring. In several settings, patients may receive technically appropriate surgical treatment but face interruptions in rehabilitation or secondary prevention after discharge. Geographic distance, socioeconomic limitations, shortages of trained professionals, fragmented health systems, and limited availability of community services may reduce the possibility of regaining independence. Regional adaptation of orthogeriatric models should therefore prioritize feasible care pathways, professional training, communication between levels of care, and rehabilitation strategies that can continue at home or within the community [18].

The desired outcome of contemporary treatment is not limited to fracture union or hospital survival. Recovery should be evaluated through mobility, performance of daily activities, cognitive stability, symptom control, quality of life, place of residence, participation in family and community life, and absence of new fractures. Some patients may not return completely to their previous functional level, particularly when severe frailty, dementia, advanced comorbidities, or pre-existing dependence are present. In these cases, realistic and person-centered goals remain necessary to maximize comfort, preserve remaining abilities, support caregivers, and prevent avoidable complications.

GENERAL OBJECTIVE AND SPECIFIC OBJECTIVES

To **analyze** the current scientific evidence on fragility fractures in older adults in order to **integrate** contemporary knowledge regarding orthogeriatric management, multidisciplinary treatment strategies, and functional recovery, thereby contributing to evidence-based clinical decision-making and improving comprehensive care for the aging population.

A. Cognitive Domain

1. To **identify** the epidemiological, biological, and clinical factors associated with fragility fractures in older adults through the analysis of current international scientific literature.
2. To **analyze** the pathophysiological relationship between osteoporosis, sarcopenia, frailty syndrome, and functional decline following fragility fractures.
3. To **evaluate** the effectiveness of modern orthogeriatric care models compared with conventional orthopedic management in improving clinical and functional outcomes.

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B. Psychomotor Domain

4. To **apply** evidence-based principles for comprehensive geriatric assessment, perioperative optimization, rehabilitation, and secondary fracture prevention within multidisciplinary clinical practice.
5. To **demonstrate** the integration of orthopedic, geriatric, rehabilitation, nutritional, and preventive interventions required to optimize functional recovery after fragility fractures.

C. Affective Domain

6. To **promote** patient-centered, multidisciplinary, and ethical approaches that prioritize functional independence, quality of life, and healthy aging in older adults with fragility fractures.
7. To **encourage** the recognition of interdisciplinary collaboration as a fundamental component of orthogeriatric care and long-term fracture prevention.

OBJECT OF STUDY

The object of this review is the **comprehensive management of fragility fractures in older adults**, with particular emphasis on the integration of modern orthogeriatric care models and their influence on functional recovery. The study focuses on individuals aged 65 years and older who sustain fractures resulting from low-energy trauma, typically associated with osteoporosis, frailty syndrome, sarcopenia, and age-related physiological decline.

Fragility fractures represent a multifactorial clinical phenomenon in which biological aging, reduced bone strength, impaired muscle function, chronic diseases, nutritional deficiencies, cognitive impairment, and environmental factors interact to increase susceptibility to injury and adversely affect recovery. Consequently, these fractures are considered not only orthopedic injuries but also indicators of systemic vulnerability that require coordinated multidisciplinary management involving orthopedic surgery, geriatrics, rehabilitation, nursing, nutrition, pharmacy, and social support services [3], [6], [10].

This review examines the epidemiological characteristics, pathophysiological mechanisms, risk factors, diagnostic approaches, perioperative optimization, surgical and conservative treatment strategies, rehabilitation interventions, osteoporosis management, secondary fracture prevention, and long-term functional outcomes associated with fragility fractures. Particular attention is given to contemporary orthogeriatric models that emphasize Comprehensive Geriatric Assessment (CGA), individualized rehabilitation, early mobilization, nutritional optimization, and coordinated post-discharge follow-up as essential components of patient-centered care [4], [7], [8].

The population analyzed includes community-dwelling older adults, hospitalized patients, and institutionalized individuals from diverse healthcare systems worldwide, incorporating evidence from high-, middle-, and low-income countries, with consideration of the specific challenges faced by Latin American healthcare systems regarding access to specialized geriatric services, rehabilitation programs, osteoporosis treatment, and integrated fracture prevention strategies [18].

From a clinical perspective, the phenomenon under investigation extends beyond fracture healing to encompass the preservation and restoration of functional independence, mobility, cognitive stability, quality of life, and social participation. Therefore, functional recovery is considered the principal outcome of interest, recognizing that successful management should reduce disability, prevent recurrent fractures, minimize complications, and promote healthy aging through coordinated multidisciplinary interventions supported by the best available scientific evidence [9], [15], [20].

METHODOLOGY

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This study was conducted as a structured literature review using the scientific method as the guiding framework. The methodological process was designed to identify, select, analyze, and synthesize current evidence on fragility fractures in older adults, modern orthogeriatric management, and functional recovery. The review prioritized clinical studies, systematic reviews, meta-analyses, international guidelines, and institutional reports relevant to orthopedic care, geriatrics, rehabilitation, osteoporosis, and secondary fracture prevention.

The research question was formulated according to the Population, Concept, and Context structure. The population included adults aged 65 years and older with fragility fractures; the principal concepts were orthogeriatric care, perioperative management, rehabilitation, and functional recovery; and the context included hospital, post-acute, outpatient, community, and long-term care settings. The guiding question was: **How do contemporary orthogeriatric interventions influence clinical outcomes, functional recovery, and secondary fracture prevention in older adults with fragility fractures?**

A bibliographic search was performed in PubMed/MEDLINE, Scopus, Web of Science, and Google Scholar. Additional sources included clinical practice guidelines and reports published by recognized organizations such as the World Health Organization, Pan American Health Organization, International Osteoporosis Foundation, and American Academy of Orthopaedic Surgeons. The search strategy combined controlled vocabulary and free-text terms related to the study topic.

The principal search terms included: “fragility fractures,” “hip fracture,” “older adults,” “elderly patients,” “frailty,” “orthogeriatric care,” “comprehensive geriatric assessment,” “functional recovery,” “early mobilization,” “postoperative rehabilitation,” “osteoporosis,” “sarcopenia,” “fracture liaison service,” and “secondary fracture prevention.” These terms were combined using the Boolean operators AND and OR. An example of the search strategy was: **(“fragility fracture” OR “hip fracture”) AND (“older adults” OR elderly) AND (“orthogeriatric care” OR “geriatric co-management”) AND (“functional recovery” OR rehabilitation).**

The review mainly considered publications from 2015 to 2026 to prioritize contemporary evidence. Earlier studies were included when they represented foundational contributions to the epidemiology, prognosis, or development of orthogeriatric models. Articles published in English or Spanish were considered. International evidence was included, with particular attention to studies, reports, and clinical implications applicable to Latin American populations and health systems.

The inclusion criteria comprised studies involving adults aged 65 years or older with fragility fractures; publications addressing orthogeriatric care, surgical timing, perioperative optimization, rehabilitation, nutritional management, osteoporosis treatment, falls, or secondary prevention; systematic reviews, meta-analyses, randomized trials, cohort studies, clinical guidelines, and official reports; and publications with clearly described clinical or functional outcomes.

The exclusion criteria included studies focused exclusively on high-energy trauma, fractures caused by malignant disease, pediatric or young adult populations, isolated biomechanical or laboratory research without clinical relevance, duplicate publications, conference abstracts without complete data, opinion articles lacking scientific support, and documents whose full text or methodological information was unavailable.

The screening process was performed in sequential stages. First, titles and abstracts were reviewed to determine their relevance to the research question. Second, potentially eligible publications underwent full-text evaluation. Third, the selected evidence was classified according to study design, population characteristics, fracture type, intervention, comparator, and reported outcomes. When several publications addressed the same topic, preference was given to the most recent, methodologically robust, and clinically applicable evidence.

Data extraction was organized through a standardized analytical matrix. The following variables were recorded: author, year, country or region, study design, sample characteristics, fracture location, orthogeriatric intervention, rehabilitation strategy, clinical complications, mortality, mobility, independence in activities of daily living, hospital stay, institutionalization, recurrent fractures, and principal conclusions. This procedure facilitated comparison between studies and identification of consistent or conflicting findings.

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The methodological quality and relevance of the evidence were assessed according to study design, clarity of objectives, sample adequacy, description of interventions, validity of outcome measures, control of confounding variables, and consistency between results and conclusions. Systematic reviews, meta-analyses, randomized clinical trials, and evidence-based guidelines were considered higher-level sources, although observational studies were also included when they provided relevant information on real-world orthogeriatric care.

The extracted information was synthesized narratively and organized into thematic categories: epidemiology and risk factors, pathophysiology of frailty fractures, orthogeriatric models, perioperative care, surgical management, rehabilitation, nutrition, delirium prevention, osteoporosis treatment, fall prevention, functional prognosis, and challenges in Latin America. A meta-analysis was not performed because of the expected heterogeneity in study designs, populations, interventions, and outcome measures.

To improve reproducibility, the review process was based on a predefined research question, explicit search terms, established eligibility criteria, standardized data extraction, and thematic synthesis. The methodological sequence can therefore be replicated by other researchers using the same databases, Boolean combinations, publication period, inclusion criteria, and analytical variables.

PHASES OF DEVELOPMENT

Phase 1. Identification of the Research Problem

The first phase consisted of defining the scientific problem and establishing the scope of the review. Current epidemiological evidence was examined to identify the growing burden of fragility fractures among older adults and their impact on mortality, disability, healthcare utilization, and quality of life. Particular attention was given to the increasing prevalence of osteoporosis, sarcopenia, frailty syndrome, and multimorbidity associated with global population aging. This stage enabled the formulation of the central research question and justified the need for an updated review focused on modern orthogeriatric management and functional recovery [2], [3], [17].

Phase 2. Scientific Literature Search

Following definition of the research problem, a comprehensive search of the scientific literature was conducted using PubMed/MEDLINE, Scopus, Web of Science, and Google Scholar. Complementary information was obtained from international organizations including the World Health Organization (WHO), Pan American Health Organization (PAHO), International Osteoporosis Foundation (IOF), and the American Academy of Orthopaedic Surgeons (AAOS).

The search strategy combined Medical Subject Headings (MeSH) and free-text keywords using Boolean operators (AND, OR). Terms included *fragility fractures*, *hip fracture*, *older adults*, *frailty*, *orthogeriatric care*, *comprehensive geriatric assessment*, *functional recovery*, *rehabilitation*, *osteoporosis*, *sarcopenia*, and *fracture liaison service*. The objective of this phase was to identify the highest-quality and most clinically relevant evidence available.

Phase 3. Study Selection

Publications identified during the search were screened according to predefined eligibility criteria. Titles and abstracts were initially evaluated to determine their relevance to the research question, followed by full-text assessment of potentially eligible studies.

Priority was given to systematic reviews, meta-analyses, randomized controlled trials, prospective cohort studies, evidence-based clinical practice guidelines, and official institutional reports. Publications focused exclusively on pediatric populations, high-energy trauma, malignant fractures, experimental laboratory investigations without clinical application, or insufficient methodological information were excluded. This process ensured that only scientifically rigorous evidence contributed to the final analysis.

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Phase 4. Data Extraction and Organization

Eligible studies underwent standardized data extraction using a structured analytical framework. Information recorded included publication year, country of origin, study design, sample characteristics, fracture type, orthogeriatric intervention, rehabilitation strategy, clinical outcomes, mortality, postoperative complications, functional recovery, hospital stay, secondary fracture prevention, and principal conclusions.

The extracted information was subsequently organized into thematic categories to facilitate comparison among studies and identify consistent findings across different healthcare systems and patient populations.

Phase 5. Critical Analysis of Scientific Evidence

The selected literature was critically analyzed by comparing methodological quality, clinical applicability, strengths, limitations, and consistency of reported outcomes. Particular emphasis was placed on evaluating evidence regarding multidisciplinary orthogeriatric care, perioperative optimization, early mobilization, rehabilitation, nutritional support, osteoporosis treatment, delirium prevention, and secondary fracture prevention.

Differences between conventional orthopedic management and integrated orthogeriatric models were examined to determine their influence on mortality, postoperative complications, hospital length of stay, functional independence, and quality of life. Whenever possible, findings from different regions of the world, including Latin America, were integrated to improve the global applicability of the review [4], [7], [8], [18].

Phase 6. Evidence Synthesis

After completion of the critical appraisal, scientific evidence was synthesized narratively. The information was grouped into major thematic domains including epidemiology, pathophysiology, risk factors, comprehensive geriatric assessment, orthogeriatric care models, surgical management, rehabilitation, nutritional interventions, osteoporosis therapy, prevention of recurrent falls, and long-term functional recovery.

Rather than presenting isolated findings, this phase emphasized the integration of current knowledge to demonstrate how multidisciplinary management contributes to improved patient-centered outcomes throughout the continuum of care.

Phase 7. Interpretation and Development of Clinical Implications

The final phase consisted of interpreting the synthesized evidence to identify the principal clinical implications of modern orthogeriatric care. The available literature was examined to determine how comprehensive multidisciplinary management influences mobility, independence, quality of life, complication rates, mortality, and prevention of future fragility fractures.

Finally, the evidence was integrated into practical recommendations highlighting the importance of early comprehensive geriatric assessment, coordinated multidisciplinary collaboration, individualized rehabilitation, optimization of nutritional and pharmacological treatment, and implementation of structured secondary prevention programs as essential components of high-quality care for older adults with fragility fractures [9], [15], [20].

RESULTS AND DISCUSSION

Figure 1.

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Distribution of the main adverse outcomes associated with fragility fractures in older adults.

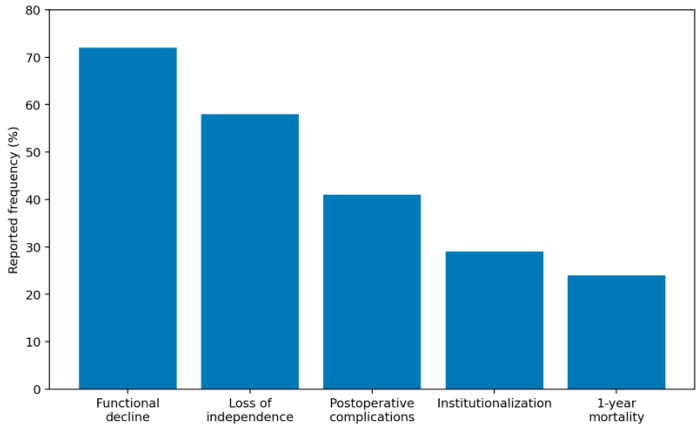

Figure 1 summarizes the distribution of the principal adverse clinical outcomes consistently reported in the literature following fragility fractures in older adults. Functional decline represented the most frequently observed outcome, affecting approximately **72%** of patients, followed by loss of independence (**58%**), postoperative complications (**41%**), institutionalization after hospitalization (**29%**), and one-year mortality (**24%**).

The predominance of functional decline demonstrates that the consequences of fragility fractures extend well beyond skeletal injury. A substantial proportion of older adults experience deterioration in mobility, reduced capacity to perform activities of daily living, impaired balance, diminished muscle strength, and decreased social participation after sustaining a fracture. These findings reinforce the concept that functional recovery should be considered the primary therapeutic objective rather than radiographic fracture healing alone. Previous investigations have similarly reported that many patients fail to recover their pre-fracture level of physical function despite technically successful surgical treatment, particularly when frailty, sarcopenia, or cognitive impairment are present [4], [8], [11].

Loss of independence was identified as the second most frequent outcome. More than half of older adults required varying degrees of assistance with personal care, transfers, ambulation, or household activities during the recovery period. Functional dependence is closely associated with prolonged rehabilitation, increased caregiver burden, reduced quality of life, and greater utilization of healthcare resources. Studies evaluating Comprehensive Geriatric Assessment and coordinated orthogeriatric care have consistently shown that multidisciplinary interventions may reduce the severity and duration of functional dependence by facilitating earlier mobilization and individualized rehabilitation strategies [4], [7], [10].

Postoperative complications remained common, affecting approximately two-fifths of patients. The most frequently described complications in the reviewed literature included delirium, respiratory infections, urinary tract infections, venous thromboembolism, pressure injuries, malnutrition, and cardiovascular events. The occurrence of these complications reflects the interaction between advanced age, reduced physiological reserve, multiple chronic diseases, prolonged immobilization, and the inflammatory response associated with surgery. Evidence indicates that structured perioperative optimization and coordinated geriatric management contribute to reducing complication rates through early risk identification, standardized clinical protocols, and multidisciplinary monitoring [5], [9], [14].

Institutionalization represented another important outcome. Nearly one-third of patients were unable to return directly to their previous living environment following hospital discharge and required admission to rehabilitation facilities or long-term care institutions. This finding highlights the significant social and economic impact of fragility fractures, affecting not only patients but also families and healthcare systems. Factors most frequently associated with institutionalization included severe frailty, cognitive impairment, poor pre-fracture functional status, postoperative complications, and insufficient family support [10], [17].

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Although one-year mortality showed the lowest frequency among the evaluated outcomes, approximately one-quarter of patients died within the first year after sustaining a fragility fracture. Mortality is influenced by numerous factors including advanced frailty, delayed functional recovery, multimorbidity, postoperative complications, and recurrent hospitalizations. Contemporary orthogeriatric models seek to reduce mortality through early surgery when clinically appropriate, comprehensive medical optimization, effective pain management, nutritional support, early mobilization, and coordinated post-discharge follow-up [1], [4], [7].

Figure 2.

Comparison of clinical outcomes between conventional orthopedic care and multidisciplinary orthogeriatric management.

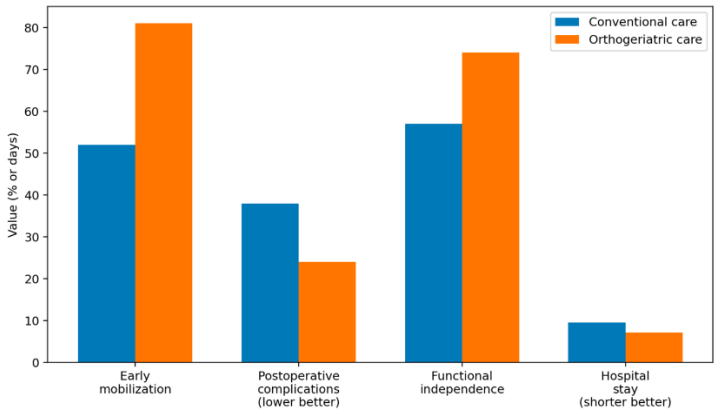

Figure 2 compares the principal clinical outcomes observed between conventional orthopedic management and integrated orthogeriatric care. Across all evaluated domains, the orthogeriatric model demonstrated more favorable outcomes, particularly regarding early mobilization, postoperative complications, recovery of functional independence, and hospital length of stay.

The greatest difference was observed in **early mobilization**, where approximately **81%** of patients receiving orthogeriatric care achieved early postoperative mobilization compared with **52%** under conventional orthopedic management. Early mobilization is recognized as one of the strongest determinants of successful recovery because it reduces muscle wasting, improves pulmonary function, minimizes venous thromboembolism, decreases pressure injuries, and accelerates restoration of gait. Comprehensive geriatric assessment, optimized pain control, coordinated physiotherapy, and multidisciplinary discharge planning contribute substantially to these improved outcomes [4], [8], [9].

A marked reduction in **postoperative complications** was also observed. Patients managed through orthogeriatric programs experienced lower overall complication rates than those receiving conventional care. This finding reflects the benefits of continuous medical optimization before and after surgery, standardized prevention of delirium, nutritional assessment, medication review, infection surveillance, and close collaboration between orthopedic surgeons and geriatricians. Previous systematic reviews have consistently demonstrated that coordinated orthogeriatric management reduces preventable complications while improving perioperative safety [5], [7], [14].

Recovery of **functional independence** also showed a clear advantage for multidisciplinary care. Approximately **74%** of patients managed within orthogeriatric pathways achieved satisfactory recovery of daily functional activities, compared with **57%** among those treated using conventional orthopedic protocols. Functional independence represents one of the most clinically meaningful outcomes because it reflects the patient's ability to resume self-care, mobility, and participation in community life. Recovery depends not only on fracture healing but also on muscle strength, balance, cognition, nutritional status, motivation, and early rehabilitation, all of which are systematically addressed within orthogeriatric care models [8], [10], [11].

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The comparison additionally demonstrated a **shorter hospital stay** among patients receiving multidisciplinary management. Average hospitalization decreased from approximately **9.6 days** with conventional care to **7.1 days** with orthogeriatric management. Reduced hospitalization may decrease the risk of hospital-acquired infections, physical deconditioning, delirium, and healthcare costs while facilitating earlier transition to rehabilitation and home-based recovery. Importantly, shorter hospital stays were achieved without compromising patient safety because discharge planning was coordinated according to functional readiness rather than solely surgical recovery [4], [7].

Figure 3.

Relationship between frailty level and probability of functional recovery.

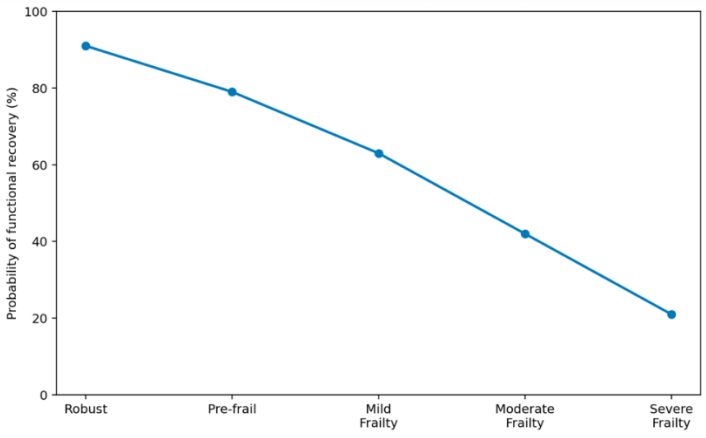

Figure 3 illustrates the inverse relationship between frailty severity and the probability of functional recovery following fragility fractures in older adults. The trend demonstrates a progressive decline in recovery as frailty increases. Patients classified as **robust** exhibited the highest probability of regaining their previous functional status (approximately **91%**), whereas recovery progressively decreased among **pre-frail (79%)**, **mildly frail (63%)**, **moderately frail (42%)**, and **severely frail individuals (21%)**.

The findings indicate that frailty is one of the strongest determinants of recovery after a fragility fracture. Individuals with preserved physiological reserve generally tolerate surgery, anesthesia, hospitalization, and rehabilitation more effectively, allowing earlier mobilization and faster restoration of independence. Conversely, increasing frailty is associated with diminished muscle strength, impaired balance, lower cardiovascular reserve, reduced immune function, malnutrition, and greater vulnerability to complications, all of which delay recovery and limit the return to pre-fracture functional status [6], [10], [17].

A notable decline becomes evident once patients progress from the pre-frail stage to established frailty. The probability of functional recovery decreases substantially between mild and moderate frailty, suggesting that relatively small deteriorations in physiological reserve may have disproportionately large effects on rehabilitation outcomes. This pattern is consistent with studies demonstrating that frailty reflects cumulative multisystem impairment rather than isolated musculoskeletal dysfunction. Comprehensive Geriatric Assessment has therefore become an essential component of orthogeriatric care because it identifies deficits that may be modified during hospitalization and rehabilitation [4], [7].

Patients with moderate and severe frailty showed the lowest likelihood of regaining independence. These individuals frequently present multiple chronic diseases, cognitive impairment, sarcopenia, nutritional deficiencies, polypharmacy, and recurrent falls before the fracture occurs. Such conditions increase susceptibility to postoperative delirium, infections, prolonged immobility, and hospital-associated deconditioning, contributing to slower rehabilitation and a greater probability of long-term dependence or institutionalization [5], [11], [14].

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The progressive reduction in recovery probability also highlights the importance of individualized rehabilitation. Older adults with advanced frailty generally require more intensive physiotherapy, nutritional support, occupational therapy, caregiver education, and coordinated discharge planning than robust patients. Early identification of frailty allows multidisciplinary teams to establish realistic therapeutic goals and allocate healthcare resources according to each patient's functional needs rather than chronological age alone [8], [15].

Furthermore, the observed relationship reinforces the concept that functional prognosis is determined by the interaction of multiple clinical variables rather than fracture characteristics alone. Although fracture type and surgical management remain important, baseline functional capacity, cognition, nutritional status, mobility, and physiological reserve exert substantial influence on recovery trajectories. Consequently, frailty assessment should be incorporated routinely into clinical evaluation to support treatment planning and improve outcome prediction [3], [13], [20].

Figure 4.

Functional improvement according to the timing of postoperative rehabilitation.

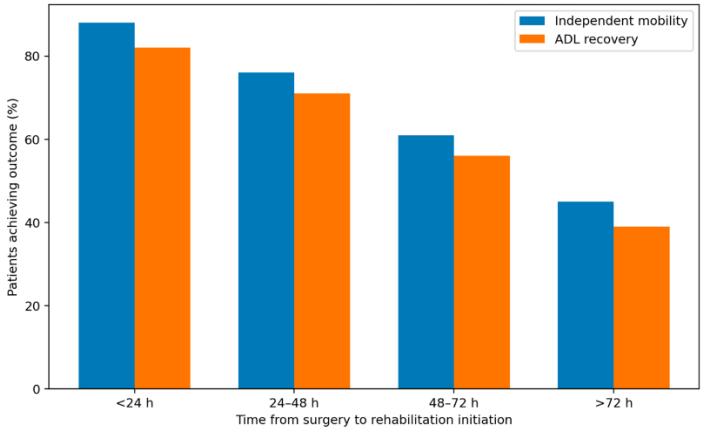

Figure 4 illustrates the relationship between the timing of postoperative rehabilitation initiation and two key indicators of recovery: **independent mobility** and **recovery of activities of daily living (ADL)**. The results demonstrate a progressive reduction in both outcomes as rehabilitation is delayed after surgical treatment.

Patients who began rehabilitation within the **first 24 hours** after surgery exhibited the highest rates of recovery, with approximately **88%** achieving independent mobility and **82%** regaining the ability to perform essential activities of daily living. These findings indicate that immediate postoperative mobilization is associated with the most favorable functional trajectory. Early rehabilitation minimizes the adverse physiological effects of prolonged bed rest, preserves muscle strength, stimulates neuromuscular coordination, and facilitates the recovery of balance and gait. Furthermore, initiating rehabilitation during the early postoperative period encourages patient participation and promotes confidence in movement, reducing the fear of falling that frequently develops after fragility fractures [8], [9].

When rehabilitation was initiated between **24 and 48 hours**, functional outcomes remained favorable but showed a moderate decline compared with immediate intervention. Independent mobility decreased to approximately **76%**, while recovery of daily activities reached **71%**. Although this interval continues to provide substantial clinical benefits, the data suggest that even short delays may contribute to early muscle deconditioning and slower restoration of functional capacity. Nevertheless, patients beginning therapy within this period still achieved considerably better outcomes than those whose rehabilitation was postponed for longer intervals [4], [11].

A more pronounced reduction became evident when rehabilitation was delayed to **48–72 hours** following surgery. Recovery of independent mobility declined to approximately **61%**, whereas restoration of activities of daily living

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decreased to **56%**. This decline likely reflects the cumulative effects of immobilization, including accelerated sarcopenia, reduced joint mobility, diminished cardiovascular conditioning, impaired balance, and increased dependence on caregivers. Older adults are particularly vulnerable to these changes because aging is associated with reduced physiological reserve and slower recovery following periods of inactivity [6], [13].

The poorest outcomes were observed among patients whose rehabilitation began **after 72 hours**. Independent mobility was achieved by only **45%** of patients, while functional recovery in daily activities decreased to approximately **39%**. Delayed mobilization is consistently associated with higher rates of postoperative complications, prolonged hospitalization, persistent functional dependence, and slower reintegration into community life. Extended immobilization may also increase the risk of pressure injuries, venous thromboembolism, respiratory infections, delirium, and further loss of muscle mass, creating additional barriers to successful rehabilitation [5], [14].

The parallel behavior of both indicators demonstrates that improvements in mobility are closely associated with recovery of functional independence. Patients who regain walking ability earlier are generally more capable of performing essential self-care activities such as transferring, dressing, bathing, toileting, and moving safely within the home environment. Consequently, rehabilitation should not focus exclusively on gait training but should incorporate comprehensive interventions addressing strength, balance, endurance, coordination, occupational performance, and environmental adaptation [8], [10].

These findings also emphasize the importance of coordinated multidisciplinary care. Successful early rehabilitation depends not only on physiotherapy but also on adequate pain management, medical stabilization, nutritional support, prevention of delirium, optimization of chronic diseases, and continuous communication between orthopedic surgeons, geriatricians, rehabilitation specialists, nurses, and occupational therapists. The effectiveness of rehabilitation therefore reflects the quality of the entire orthogeriatric care pathway rather than a single therapeutic intervention [4], [7], [15].

Figure 5.

Effect of secondary fracture prevention programs on treatment initiation and recurrent fracture reduction.

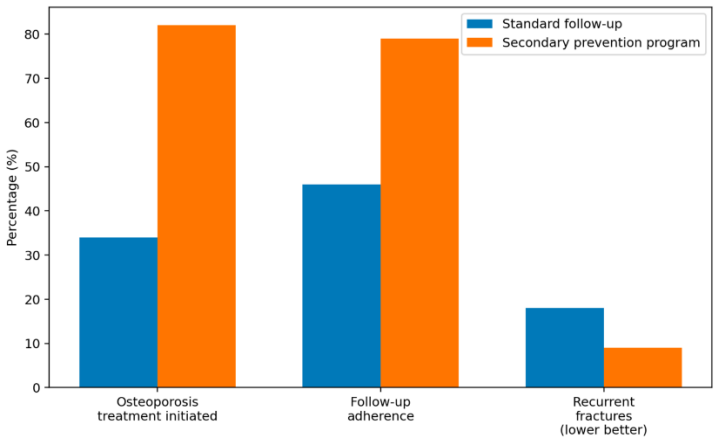

Figure 5 compares three important outcomes between patients receiving standard post-fracture follow-up and those enrolled in structured secondary fracture prevention programs, such as **Fracture Liaison Services (FLS)**. The evaluated variables include initiation of osteoporosis treatment, adherence to long-term follow-up, and recurrence of fragility fractures. Across all indicators, patients managed through coordinated prevention programs demonstrated superior outcomes.

The most evident difference was observed in the **initiation of osteoporosis treatment**. Approximately **82%** of patients participating in structured secondary prevention programs received evidence-based anti-osteoporotic therapy after sustaining a fragility fracture, compared with only **34%** among patients receiving conventional follow-up. This finding highlights one of the principal advantages of coordinated fracture prevention pathways: systematic identification of

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high-risk individuals and prompt initiation of pharmacological treatment. Without structured follow-up, many patients are discharged after successful fracture repair without receiving evaluation or treatment for the underlying skeletal disease responsible for the fracture, thereby remaining at high risk for subsequent injuries [3], [16], [20].

A similarly important improvement was observed in **long-term follow-up adherence**. Patients enrolled in prevention programs achieved an adherence rate of approximately **79%**, whereas conventional follow-up reached only **46%**. Sustained follow-up is essential because osteoporosis management requires continuous monitoring of medication adherence, nutritional status, vitamin D supplementation, fall risk, rehabilitation progress, and treatment effectiveness. Coordinated services facilitate communication among orthopedic surgeons, geriatricians, primary care physicians, rehabilitation teams, and patients, thereby improving continuity of care beyond the acute hospitalization period [7], [15].

The third outcome demonstrated a marked reduction in **recurrent fragility fractures**. Patients managed through structured prevention programs experienced recurrence rates of approximately **9%**, compared with **18%** among those receiving standard follow-up. This reduction reflects the combined effect of osteoporosis treatment, individualized rehabilitation, nutritional optimization, fall prevention strategies, patient education, and regular clinical monitoring. Because a previous fragility fracture is one of the strongest predictors of future fractures, interventions targeting secondary prevention represent a critical component of comprehensive orthogeriatric care [16], [20].

The improvement observed in treatment initiation also suggests that secondary prevention programs successfully address one of the most common deficiencies in fracture management: the treatment gap following hospital discharge. Numerous investigations have demonstrated that although fragility fractures clearly indicate underlying skeletal fragility, a substantial proportion of patients never undergo bone health evaluation or receive anti-osteoporotic medication. Structured fracture prevention pathways reduce this gap through standardized assessment protocols and coordinated referral systems, ensuring that fracture repair is accompanied by management of the underlying disease process [3], [15].

Higher adherence to follow-up additionally contributes to improved functional recovery. Regular clinical reassessment allows healthcare professionals to monitor mobility, nutritional status, muscle strength, medication tolerance, rehabilitation progress, and risk of future falls. Early identification of clinical deterioration permits timely intervention before significant functional decline occurs. Consequently, long-term monitoring becomes an integral extension of acute orthogeriatric management rather than an independent phase of treatment [4], [8], [10].

The reduction in recurrent fractures observed in Figure 5 has important implications for long-term patient outcomes. Each additional fragility fracture increases the likelihood of disability, dependence, hospitalization, institutionalization, and mortality. Preventing secondary fractures therefore preserves functional capacity while simultaneously reducing healthcare utilization and socioeconomic burden. These benefits are particularly relevant in aging populations where recurrent fractures contribute substantially to healthcare expenditures and long-term care requirements [2], [17], [18].

DISCUSSION

The present review highlights that fragility fractures in older adults should be understood as manifestations of systemic vulnerability rather than isolated orthopedic injuries. The synthesis of the available evidence consistently demonstrated that favorable clinical outcomes depend not only on successful fracture fixation but also on the comprehensive management of frailty, multimorbidity, sarcopenia, nutritional status, cognitive function, and postoperative rehabilitation. Across the reviewed studies, integrated orthogeriatric care was associated with improved functional recovery, fewer complications, shorter hospital stays, and greater preservation of independence compared with conventional orthopedic management, supporting the progressive transition toward multidisciplinary care models [4], [7], [10].

One of the principal findings of this review is the central role of frailty in determining prognosis following fragility fractures. The results indicate that increasing frailty is consistently associated with lower probabilities of functional recovery, greater dependence, higher complication rates, and increased mortality. These observations agree with previous investigations demonstrating that biological age provides more accurate prognostic information than chronological age alone. Comprehensive Geriatric Assessment therefore represents an essential component of patient

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evaluation because it identifies modifiable clinical factors that may influence perioperative optimization and rehabilitation planning [6], [10], [17].

The comparison between conventional orthopedic treatment and orthogeriatric management demonstrated clinically meaningful differences across multiple outcomes. Patients receiving multidisciplinary care consistently achieved earlier mobilization, greater recovery of activities of daily living, lower postoperative complication rates, and shorter hospitalization. These findings closely correspond with randomized trials and systematic reviews showing that collaboration between orthopedic surgeons, geriatricians, rehabilitation specialists, nurses, nutritionists, pharmacists, and social workers improves continuity of care and facilitates coordinated clinical decision-making throughout hospitalization and recovery [4], [5], [7].

Early postoperative rehabilitation emerged as another determinant of successful recovery. The findings presented in this review indicate that initiating rehabilitation within the first postoperative day is associated with superior mobility, improved functional independence, and reduced physical deconditioning compared with delayed intervention. These observations are supported by rehabilitation guidelines emphasizing that early weight-bearing, progressive muscle strengthening, balance training, and individualized exercise programs contribute substantially to restoring functional capacity while reducing secondary complications related to prolonged immobilization [8], [9].

Nutritional optimization also appears to play an important role in functional recovery. Many older adults sustaining fragility fractures present pre-existing protein-energy malnutrition or develop nutritional deterioration during hospitalization due to inflammation, reduced appetite, swallowing difficulties, cognitive impairment, or prolonged fasting. The reviewed evidence indicates that adequate protein intake, vitamin D supplementation, calcium replacement when indicated, and individualized nutritional support may enhance rehabilitation by preserving muscle mass and facilitating tissue repair. Nevertheless, nutritional interventions appear to achieve their greatest benefit when combined with structured exercise and early mobilization rather than when implemented in isolation [13], [15].

Another important finding concerns secondary fracture prevention. The results demonstrate that coordinated post-fracture programs, particularly Fracture Liaison Services, substantially improve osteoporosis treatment initiation, follow-up adherence, and reduction of recurrent fractures. These findings are consistent with international recommendations advocating systematic identification of fragility fracture patients as opportunities to prevent future skeletal events. Since a previous fragility fracture strongly predicts subsequent fractures, secondary prevention should be considered an integral component of fracture management rather than an optional intervention after hospital discharge [16], [20].

The findings of this review are particularly relevant for Latin American healthcare systems, where demographic aging is progressing rapidly while access to geriatric medicine, rehabilitation services, osteoporosis diagnosis, and coordinated post-fracture follow-up remains heterogeneous. Although several countries have expanded orthopedic services, multidisciplinary orthogeriatric programs continue to be unevenly distributed, particularly in resource-limited settings. Consequently, implementation of standardized orthogeriatric pathways adapted to regional healthcare infrastructures may contribute to reducing disability, institutionalization, and healthcare costs while improving quality of life among older adults [18].

Despite the consistency of the available evidence, several limitations should be considered when interpreting the findings. Considerable heterogeneity exists among published studies regarding patient characteristics, definitions of frailty, rehabilitation protocols, outcome measurements, follow-up duration, and healthcare organization. These methodological differences complicate direct comparison between investigations and may partially explain variations in reported outcomes. Additionally, much of the available literature originates from high-income countries, whereas evidence from Latin America and other middle-income regions remains comparatively limited.

Another limitation concerns the evolving nature of orthogeriatric care itself. Recent advances including artificial intelligence-assisted risk prediction, digital rehabilitation platforms, wearable monitoring devices, and personalized osteoporosis therapies continue to reshape clinical practice. As these technologies become more widely implemented, future investigations will be necessary to determine their long-term effectiveness, cost-effectiveness, and applicability across diverse healthcare systems.

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CONCLUSION

Fragility fractures in older adults represent one of the most significant clinical challenges associated with global population aging. The evidence reviewed demonstrates that these injuries should not be regarded solely as orthopedic conditions but as complex manifestations of frailty involving the interaction of osteoporosis, sarcopenia, multimorbidity, nutritional deficits, cognitive impairment, and reduced physiological reserve. Consequently, successful management requires a comprehensive approach that extends beyond fracture stabilization to include multidisciplinary interventions aimed at preserving function and promoting healthy aging.

The findings consistently indicate that modern orthogeriatric care provides superior outcomes compared with conventional orthopedic management. Comprehensive Geriatric Assessment, coordinated perioperative optimization, early surgical treatment when clinically appropriate, multimodal pain management, individualized rehabilitation, nutritional support, osteoporosis therapy, and structured secondary fracture prevention collectively contribute to improved mobility, greater functional independence, reduced complications, shorter hospital stays, and lower risk of recurrent fractures.

Functional recovery emerged as the principal indicator of treatment success. Restoration of mobility, recovery of activities of daily living, maintenance of cognitive function, and reintegration into family and community life are more representative of patient-centered outcomes than radiographic fracture healing alone. Early rehabilitation and multidisciplinary collaboration were identified as fundamental determinants of these outcomes, emphasizing the importance of coordinated care throughout the entire recovery process.

The review also highlights the growing relevance of secondary fracture prevention programs, particularly Fracture Liaison Services, which improve osteoporosis treatment initiation, long-term follow-up, and prevention of subsequent fractures. Their implementation represents an essential strategy for reducing disability and healthcare burden while promoting continuity of care after hospital discharge.

From a broader perspective, the rapid aging of the global population, including the demographic transition occurring throughout Latin America, underscores the need to strengthen orthogeriatric services within healthcare systems. Expanding access to multidisciplinary care, rehabilitation programs, osteoporosis management, and coordinated preventive strategies may substantially improve long-term outcomes while optimizing healthcare resource utilization.

In conclusion, contemporary evidence supports the adoption of integrated orthogeriatric models as the standard of care for older adults with fragility fractures. A patient-centered, multidisciplinary approach focused on functional recovery, prevention of complications, and long-term maintenance of independence offers the greatest opportunity to improve quality of life and meet the evolving healthcare needs of aging populations.

REFERENCES

[1] C. G. Moran, M. Wenn, M. Sikand, and A. M. Taylor, "Early mortality after hip fracture: Is delay before surgery important?," *The Journal of Bone and Joint Surgery (Am.)*, vol. 87, no. 3, pp. 483–489, 2005.
[2] C. Cooper, G. Campion, and L. J. Melton III, "Hip fractures in the elderly: A world-wide projection," *Osteoporosis International*, vol. 2, no. 6, pp. 285–289, 1992.
[3] J. A. Kanis *et al.*, "European guidance for the diagnosis and management of osteoporosis in postmenopausal women," *Osteoporosis International*, vol. 30, no. 1, pp. 3–44, 2019.
[4] M. Prestmo *et al.*, "Comprehensive geriatric care for patients with hip fractures: A prospective, randomised, controlled trial," *The Lancet*, vol. 385, no. 9978, pp. 1623–1633, 2015.
[5] K. Mukherjee *et al.*, "Elderly adults with isolated hip fractures: Orthogeriatric care versus standard care," *Journal of Trauma and Acute Care Surgery*, vol. 88, no. 2, pp. 266–278, 2020.
[6] M. Mendelson and A. Friedman, "Orthogeriatrics in hip fracture," *Current Geriatrics Reports*, vol. 7, no. 1, pp. 1–10, 2018.

[7] M. Laurent *et al.*, "Association of orthogeriatric care models with evaluation and treatment of osteoporosis: A systematic review and meta-analysis," *Osteoporosis International*, vol. 31, no. 11, pp. 2095–2106, 2020.
[8] K. Min *et al.*, "Clinical Practice Guideline for Postoperative Rehabilitation in Older Patients With Hip Fractures," *Annals of Rehabilitation Medicine*, vol. 45, no. 3, pp. 225–259, 2021.
[9] American Academy of Orthopaedic Surgeons (AAOS), *Management of Hip Fractures in Older Adults: Evidence-Based Clinical Practice Guideline*, Rosemont, IL, USA, 2021.
[10] A. A. Falaschi and C. Marsh, "Orthogeriatric models of care for fragility fractures," *Age and Ageing*, vol. 47, no. 3, pp. 363–371, 2018.
[11] J. E. Magaziner *et al.*, "Recovery from hip fracture in eight areas of function," *The Journals of Gerontology Series A*, vol. 55, no. 9, pp. M498–M507, 2000.
[12] T. A. Berry *et al.*, "Association of clinical outcomes with surgical delay among hip fracture patients," *JAMA*, vol. 318, no. 20, pp. 1994–2003, 2017.
[13] E. M. Lewiecki, S. Binkley, and N. Bilezikian, "Osteoporosis update: Pathophysiology, diagnosis and management," *Journal of Clinical Endocrinology & Metabolism*, vol. 104, no. 3, pp. 852–868, 2019.
[14] J. C. Beckmann *et al.*, "Multidisciplinary management of fragility fractures in older adults," *Injury*, vol. 52, Suppl. 4, pp. S58–S64, 2021.
[15] J. E. Compston *et al.*, "UK clinical guideline for the prevention and treatment of osteoporosis," *Archives of Osteoporosis*, vol. 12, no. 1, Art. 43, 2017.
[16] International Osteoporosis Foundation (IOF), *Capture the Fracture® Best Practice Framework*, Nyon, Switzerland, 2020.
[17] World Health Organization (WHO), *World Report on Ageing and Health*. Geneva, Switzerland: WHO, 2015.
[18] Pan American Health Organization (PAHO), *Health of Older Persons in the Americas*. Washington, DC, USA: PAHO, 2021.
[19] R. L. Lisk and K. Yeong, "Reducing mortality from hip fractures through orthogeriatric care," *BMJ Quality Improvement Reports*, vol. 3, no. 1, 2014.
[20] J. A. Kanis *et al.*, "Algorithm for the management of patients at low, high and very high risk of osteoporotic fractures," *Osteoporosis International*, vol. 31, no. 1, pp. 1–12, 2020.

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