



# Academic Geriatric Orthopedics: a New Paradigm for Inpatient Care

Carmen E. Quatman<sup>1</sup> · Jessica Wiseman<sup>1</sup> · Laura Phieffer<sup>1</sup>

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## Abstract

**Purpose of Review** Healthcare systems are embarking on innovative, technologically savvy approaches to caring for our most rapidly growing population worldwide—the elderly. As healthcare systems respond, adapt, and strategically plan for this rapidly growing population, it is paramount that we develop new paradigms of care for older patients. This review highlights some of the approaches academic medical centers are taking to improve the musculoskeletal and orthopedic health of older adults.

**Recent Findings** Academic health centers are posed to set and lead the standard of care for the next generation of orthopedic care for older adults by leveraging innovative informatics platforms, quality improvement methodologies, game-changing research initiatives, education to the next generation of providers, and helping change policies to help patients receive the best quality of life possible across the aging spectrum.

**Summary** Academic geriatric orthopedics can help society embrace a new paradigm in care for older adults by leveraging rapidly developing technologically and innovative approaches to care, advanced research, and education.

**Keywords** Academic health centers · Standard of care · Technology · Quality improvement

## Background

The number of people 60 years of age or older worldwide is expected to grow from 960 million (in 2017) to nearly two billion by 2050 [1]. As healthcare systems respond and strategically plan for this dramatic growth in older patients, it is imperative that a new paradigm in care for older orthopedic patients be developed in order to ensure the most efficient, effective, safe, and supportive approach to musculoskeletal health care for patients across the aging spectrum. Because every person deserves the best quality of life, at all stages in life, it is time to create transdisciplinary collaborative care approaches to provide the right care, in the right place, at the right time across the entire continuum of care for older patients.

Compared to orthopedic patients in younger generations, geriatric patients have unique needs that necessitate a different approach of care (Table 1). For example, older adults are

susceptible to osteoporotic-related fractures which can lead to differences in fracture fixation, healing properties and time-line of healing, and overall ability to recover from fracture and return back to baseline health status compared to younger patients [2•, 3, 4, 5•]. Both chronological and physiological differences along the aging spectrum makes the geriatric orthopedic trauma patient particularly unique compared to younger patients. In general, geriatric patients often take longer to heal fractures, longer to recover medically overall, and often need more assistance than younger adults in the post fracture time period [2•]. These concepts are critical components to think about in terms of treating geriatric patients and in order to optimize care strategies. Specially trained orthopedic surgeons who have dedicated training and a focused lens of care to account for the unique needs of geriatric patients provide unique and more comprehensive approaches for the special needs of older patients. Orthopedic surgeons often approach patients with the mindset of treating the immediate problem. Instead, for geriatric populations, orthopedic surgeons who focus on geriatrics could help change the current paradigm of care to also include prevention strategies particularly related to osteoporotic fractures. Prevention in younger ages or thoughtful workup for geriatric-related problems such as osteoporosis may help periprosthetic fractures and other orthopedic pathologies that occur later in life.

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✉ Carmen E. Quatman  
Carmen.Quatman@osumc.edu

<sup>1</sup> The Ohio State University Wexner Medical Center, 376 W 10<sup>th</sup> Avenue, Columbus, OH 43210, USA

**Table 1** Fracture characteristics across the aging spectrum

	Pediatric	Adult	Older adult
Injury energy mechanism	High	High	Low
Recovery	Fast	Moderate	Slow
Fracture healing	4–8 weeks	6–10 weeks	Delay: up to 4 months
Comorbidities	Low	Low–moderate	High
Social support	High	Moderate	Low
Mobility prior to injury	High	Moderate–high	Moderate–low

The biopsychosocial factors that may lead to musculoskeletal injury and that impact outcomes are difficult to characterize and are often dependent on the chronological and physiologic age of the person. As humans go through the aging spectrum, there is a time sequential deterioration in strength, mobility, and agility. In addition, older adults have an increased susceptibility to disease and injury coincident with a decreased ability to adapt and respond to physiologic stressors [3]. As a result of the physiological, psychological, and social changes that change over the lifespan, medical management of elderly adults often necessitates a focus on care that is wanted, purposeful, tolerable, and effective, rather than a curative approach to disease [3].

In the surgical specialty of orthopedics, greater than 50% of orthopedic surgery is performed on patients 65 years of age or older [6]. Musculoskeletal diseases that progress with aging, such as osteoarthritis and osteoporosis, may significantly impact an older adult's mobility, disability, quality of life, and risk for traumatic injury [3, 4, 5•, 7–9]. Age-related degenerative changes to joints, decreased balance and strength, and many other geriatric conditions that may reduce mobility, physiologic recovery after injury, and place older adults at risk for falls are becoming increasingly pertinent health burdens for patients and society. In fact, fragility fractures (low-trauma fractures) have become a worldwide epidemic, with nearly nine million fragility fractures occurring annually across the globe [10]. Fragility fractures can lead to significant morbidity, mortality, disability, and a decrease in overall quality of life [8, 11, 12]. In response to these growing concerns and the need for improved models of care, a new “geriatric” orthopedic specialty has emerged, with fellowship training in best care practices for geriatric patients to address the unique needs for older adults with emphasis on the understanding of palliative care, multimorbidity, frailty, and general geriatric competencies [5•]. As this new subspecialty of geriatric orthopedics grows and further defines and sets the standards of care for musculoskeletal concerns for older adults, it is important to develop healthcare infrastructures to empower patients, clinicians, researchers, and business managers to initiate critical system changes to leverage technology and innovative clinical models to drive new models of care, particularly for the most vulnerable patient populations such as the elderly.

Academic health centers can create thriving centers of growth, innovation, cutting-edge research, and advanced care approaches while also serving as an educational springboard to elevate care around the world as medical trainees graduate and move on to provide healthcare globally [13]. This report will outline the motivation for creating an academic geriatric orthopedic practice to continue to promote and evolve the field of geriatric orthopedics and highlight how leveraging clinical care, advanced research, education, and healthcare policy can optimize and elevate best care practices for older patients.

## Clinical Care

Annual costs in the USA related to fragility fractures are estimated to rise to \$25.3 billion dollars for the > 3 million fragility fractures by 2025 [14]. Medicare covers approximately 80% of the fractures, 72% of which are hip fractures [15]. Academic medical centers frequently see high-risk orthopedic patients and have high acceptance of transfer patients. Transfer patients consume more hospital resources and have longer lengths of stay [16]. Orthopedic surgeons at academic centers must be equipped with the right teams and infrastructure to address the unique biopsychosocial needs of older adult patients. As tertiary referral centers, Academic Medical Centers (AMCs) care for a wide spectrum of geriatric fracture patients. AMCs often treat patients from the local community who are healthy or present with relatively few medical comorbidities in addition to high-risk, multiple comorbidities patients transferred from surrounding hospitals. The AMCs that have providers with specialized interest in Geriatric Orthopedic care benefit from the development of multidisciplinary care teams that can be engaged to develop streamlined pathways to provide timely care, decrease delays to surgery, and minimize complications in the perioperative time period for all patients despite their associated medical comorbidities. With a research focus and evidenced-based approach, these teams can focus on key quality indicators such as time to surgery, readmission rates, mortality, and osteoporosis education for the entire spectrum of geriatric fracture patients.

The International Geriatric Fracture Society (IGFS) is the first to develop a program that independently verifies and certifies achievements of fracture care programs for older adults. The program, known as the CORE Certification Program, collects and benchmarks data from internationally located fracture care programs with the objective of increasing value and outcomes for patients and improving resource allocation and reducing spending. The benchmarking capability and establishment of high standards of care is helping set the tone for policy and reimbursement. AMCs should strive for these clinical care benchmarks to ensure high quality clinical care.

The added intricacies of caring for an older patient necessitate coordination, cooperation, and communication among a large multidisciplinary team. Geriatric comanagement in orthopedics improves postoperative functional status, reduces perioperative complications, and reduces hospital length of stay [17]. Representatives from orthopedics, geriatrics, anesthesiology, internal medicine, nursing, and therapy are needed to establish a well-functioning multidisciplinary team [18]. The multidisciplinary team should establish standard definitions to facilitate accurate and complete communication and be trained on specific elements of geriatric-oriented care. A comprehensive geriatric assessment (CGA) improves key outcomes for older adult patients, decreasing rates of institutionalization and mortality [19]. Traditionally, the CGA, considered the core technology of geriatric medicine, is administered by a multidisciplinary team, usually on a dedicated floor. Since population aging is progressing, any older adult patient in the hospital may benefit from this additional component of assessment [20]. In addition, nurse and hospital staff education is necessary to improve the hospital course of an older patient through critical steps like ensuring adequate nutrition and postoperative mobility [21].

As a consequence of improved health in old age and demographic changes, the principal consumers of inpatient hospital services are older adults. Musculoskeletal changes and age-associated sensory losses that characterize older adults yield a patient that requires a unique orthopedic approach. Osteoporosis is a particular concern for surgical care due to healing potential and implant fixation complexities associated with the microarchitecture and decreased bone mass. Until a fracture occurs, osteoporosis and osteopenia are often undiagnosed in adults 65 and older [22]. A fragility fracture is a strong predictor for recidivism, yet patients are not provided sufficient guidance and effective pharmacological treatment to prevent future fractures [23, 24]. Fragility fractures should have providers who specialize in bone health wellness and prevention who can be consulted at the time of fracture to help create a new opportunity for future fracture prevention as well as bone health optimization for fracture healing. Family members are especially positioned to provide enhanced patient support and may contribute to improved patient health

outcomes, whether the patient is returning home or is going to a short-term or long-term nursing facility. Family members may be involved in filling and picking up prescriptions, reminding the patient to take medications, shopping for groceries or preparing food, encouraging the patient to remain mobile, and transportation to community resources. Social support is associated with patient mental health and mortality [25–28]. At the same time, some older adult patients may be affected by limited social support systems, necessitating sufficient education and communication for short- and long-term nursing facilities. Excellence in clinical care for geriatric orthopedic patients necessitates exceptional communication of care needs and biopsychosocial components that may impact outcomes across the entire care continuum. Involving multidisciplinary care teams, patient and caregiver communication and education at AMCs may be one of the most important aspects to providing the best evidenced-based care to geriatric orthopedic patients. A great example of this is the type of care coordination it takes to transition geriatric patients quickly to the operating room for urgent treatment of hip fractures, which is essential for moderating medical costs and length of stay [29]. We should continue to strive for excellent communication and collaboration for geriatric orthopedic patients to ultimately improve outcomes.

## Education, Community Engagement, and Policy

AMCs are often the epicenter for training of surgeons and other specialties as well as excellent centers for community engagement and development of healthcare policy. Education about core geriatric principles for orthopedic residents as well as established surgeons is integral to maintaining high standards of care for older patients. Surgeons need to be aware of the factors predictive of increased mortality in older patients, including age, male gender, low mental status, frailty, comorbidities, immobility, delirium, and living in an institution prefracture [30–37]. Older adults also have unique postoperative risk factors that put them at risk for complications, loss of independence, and increased disability. Residents, fellows, advance practice providers, and attending surgeons should have an understanding of the impact of malnutrition, frailty, sarcopenia, polypharmacy, early mobilization, postoperative delirium, social support, depression, and barriers in care transitions on older adult patients [5•]. Establishing geriatric fellowships at AMCs would allow for focused study of the entire course of care for older patients in the prehospital, hospital, and posthospital environments.

The American Orthopaedic Association has created a national fragility fracture prevention initiative, Own the Bone, to reduce future fractures, increase awareness about poor bone health, and improve osteoporosis treatment [38]. Educational

programs such as Own the Bone improve awareness across the spectrum for providers, caregivers, and patients. Hospital systems that participate in Own the Bone are encouraged to provide patient education about fall prevention strategies, dietary supplementations, and the benefits of weight-bearing exercises. Own the Bone is available to centers across the country and offers the resources and guidance to develop a comprehensive program for improving prevention and care of osteoporotic fractures.

Older adult readmissions or reoperations are associated with higher 1-year mortality and most readmissions are within 3 months of treatment of the initial injury [39–43]. Educating patients and their families regarding their hospital course and providing direction to community resources for post-hospital success may optimize the management of their injury and prevent re-injury. Patient education decreases pre- and postoperative anxiety, postoperative pain, cost, and readmissions while improving coping, length of stay, surgical outcomes, and patient satisfaction [44–51]. Patients often have some levels of control over modifiable risk factors such as motivation and resiliency to overcome adversity, setting expectations for older adult patients early, often, and consistently across in-hospital care teams for mobility and nutrition may improve patient outcomes. Whenever possible, education should be provided as it moderates patient expectations for pain relief and functional outcomes and may lead to improved patient compliance and participation in rehabilitation by setting clear expectations for recovery. Patient education materials should be designed with optimal comprehension as the objective, providing information that is understandable the first time that it is presented, about the sixth-grade reading level, with pictures [52, 53]. The majority (81%) of materials provided by the American Academy of Orthopaedic Surgeons (AAOS) are written above the eighth-grade reading level [54]. In addition, older patients may have physical impairments such as dementia, vision or hearing loss that limits their ability to read, comprehend or hear education tools and recommendations. Geriatric Orthopedic specialists should recognize these barriers to comprehension of the recovery process and find unique ways to facilitate education to patients and caregivers that overcomes these obstacles. As patients prepare to leave the hospital, communication is essential to facilitate the transition of care.

AMCs and academic geriatric orthopedic providers have the opportunity to help set the standard of care and guide healthcare policy and reimbursement. Health policy in the USA is an evolving guideline that significantly impacts healthcare systems and patient care. Bundled payment models, mandatory in some areas of the USA, hope to incentivize surgeons and hospitals by administering a financial penalty if acceptable outcomes are not achieved. Benefits from this system have been observed, including decreased length of stay and increased discharge to home [55]. However, current bundled payment models do not have sufficient patient risk

stratification to account for the complexity of patient care needs and comorbidities, particularly for those patients that may be treated at AMCs and tertiary referral centers. Older adults are more likely than younger and healthier patients to have worse outcomes and require reoperation and readmission. In the absence of risk stratification, it is possible that hospital systems that care for patients with complex injuries or diseases will lose money under the bundled payment model or that the model could result in restricted care based on patient age and comorbidities. AMCs must provide essential feedback and information regarding elder-oriented orthopedic care that uses the most effective musculoskeletal healthcare techniques while addressing the best way to minimize costs to the healthcare system.

## Research

A cornerstone of an academic medicine program is scholarship. For a geriatric orthopedic academic medicine program this includes an emphasis on the generation, dissemination, interpretation, and implementation of geriatric orthopedic research that sets standards for health, safety, and quality of care for older patients and creates healthcare policies that can impact the older adult population worldwide. One of the benefits of a large academic health center is the access to “people power” with more opportunities for social interactions with multiple disciplines involved in cutting-edge research and increased chances for transdisciplinary collaborations. Particularly if an academic geriatric orthopedic program is located in a university setting, this may provide a social network breeding ground for access to unique resources, technologies, innovative methods, and funding opportunities that may not be readily available to small community hospitals and rural healthcare facilities.

A major tenet of performing cutting edge research and clinical trials for patients is large scale research funds to carry out research, disseminate results, and implement strategies on a wide scope of practices. While high-level funding opportunities such as National Institutes of Health (NIH), Department of Defense (DOD), Patient Centered Outcomes Research Initiatives (PCORI), and Agency for Healthcare Research and Quality (AHRQ) may be available for application by many clinicians and scientists, one of the major criteria for funding by these sources is often based on an institution’s resources for successfully carrying out the proposed project. Larger healthcare systems such as AMCs may have a better infrastructure in place to demonstrate feasibility of healthcare studies and provide guidance and collaborations to more junior level investigators through clinical and translational science centers, core research centers and access to epidemiologists, bioinformatics, and biostatisticians for carrying out projects. In addition, patient registries are becoming increasingly

more common for all medical specialties. However, creation, maintenance, and data extraction may require significant funds and staffing that may not be readily available at non-academic facilities. While most hospital systems have Institutional Review Boards (IRB programs) in place, in order to support human research, AMCs may have increased access and processes in place to facilitate writing IRBs efficiently and may potentially host review boards on a more frequent basis that allows for more timely approvals for research protocols. As a result, an academic geriatric orthopedic program may have a higher emphasis on research, participate in more multicenter trials, and provide access to clinical trials that may not be readily available at non-academic medical centers.

## Conclusion

Population demographics show an increasing proportion of older adults coincident with a decreasing birth rate, leading to a necessary evolution of health provisions. Academic medical centers have the resource availability for research in addition to physicians experienced with high acuity orthopedic cases. The older adult patient population is often excluded from multicenter trials that inform academic research due to failing to meet inclusion criteria, so orthopedic surgeons treating older adults must maintain a flexibility of mindset taking into account understanding of the complex and unique factors that characterize this population. As a result, there is a need for the academic orthopedic surgeon to be a leader in maintaining high standards of care for geriatric orthopedic patients. Societies and programs, such as IGFS and Own the Bone, may be instrumental in providing a framework and incentive to achieve high standards of care. In addition, residents, physicians, transdisciplinary team members, and hospital staff should receive geriatric-oriented training to improve patient experience, patient outcomes, and reduce costs. Academic geriatric orthopedic teams should have excellent coordination, cooperation, and communication to maximize the quality and coherence of care for older patients and minimize expense or delay in medical treatment. Academic medical centers could be uniquely positioned to introduce and establish a novel framework for orthopedic care for older adults by leveraging innovative informatics platforms, quality improvement methodologies, game-changing research initiatives, education to the next generation of providers, and helping change policies so patients receive the best quality of life across the aging spectrum.

## Compliance with Ethical Guidelines

**Conflict of Interest** Carmen Quatman, Jessica Wiseman, and Laura Phieffer declare no conflict of interest. Dr. Quatman is on the board of directors for the International Geriatric Fracture Society.

**Human and Animal Rights and Informed Consent** This article does not contain any studies with human or animal subjects performed by any of the authors.

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