



Canadian Geriatrics Society

## ENHANCING CARE WITH ORTHOGERIATRIC SERVICES

### Abstract

Injurious falls are common amongst older adults, and are associated with reduced quality of life, functional decline, institutionalization, and high mortality. Various models of care exist for collaboration between orthopedic surgeons and geriatricians which can reduce mortality, delirium incidence, and functional decline. These models can take several forms; from routine geriatric consultation, to shared care models, to a dedicated orthogeriatric ward with geriatricians as the most responsible physician. All health centres with acute orthopedic trauma services should have an orthogeriatric service available for managing the care of older adults. The most appropriate model should be based upon the local context, resources, and history.

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## KEY POINTS

Orthogeriatric services are collaborative models of care between orthopedic surgery and geriatric medicine, which can take a variety of forms.

Orthogeriatric care models have demonstrated improvement in several outcomes such as mortality, delirium incidence, functional status and reduced costs compared to usual care.

There is little evidence to identify the most effective orthogeriatric model.

Given the improved outcomes, orthogeriatric services should be available in all health care settings caring for older adults with acute orthopedic trauma services.

## BACKGROUND

Fall-related injuries are common in older adults<sup>1</sup>, particularly in the oldest and those with cognitive impairment and frailty. Common injuries are hip, pelvic, vertebral, and upper limb fractures. In particular, hip fractures are associated with a high risk of death<sup>2</sup>, disability<sup>3</sup>, long-term care institutionalization<sup>3</sup>, persistent delirium<sup>4</sup> and reduced quality of life.<sup>5</sup> As a result, a coordinated, multidisciplinary approach involving geriatric principles is essential to improve patient and healthcare outcomes. For hip fracture care, peripheral nerve blocks reduce pain, decrease the risk of delirium, and likely reduce time to first mobilization.<sup>6</sup> Additionally, observational studies suggest that surgery within 48 hours for hip fracture is associated with lower risk of mortality and major complications.<sup>7-8</sup>

Almost 30,000 Canadians experience a hip fracture each year. The number of hip fractures is expected to grow steadily with the aging of the population and the economic burden is expected to rise to \$2.4 billion annually by 2041.<sup>9</sup> Worldwide, a study by Cooper et al., projected that the number of annual hip fractures will increase from 1.66 million in 1990 to approximately 6.26 million by 2050.<sup>10</sup> A recent systematic review on global costs of fragility hip fractures reported the cost of acute inpatient care and total costs in the first year after hip fracture as \$13,331 and \$43,669, respectively.<sup>11</sup>

The subspecialty of orthogeriatrics was largely developed in the United Kingdom, pioneered by two orthopedic surgeons; Lionel Cosin and Michael Devas.<sup>12</sup> Cosin helped discharge many hip fracture patients who were previously thought to require permanent care, by providing surgery and offering early rehabilitation.<sup>13</sup> Devas collaborated with Robert Irvine, a geriatrician, to create the first orthogeriatric unit in 1963, which demonstrated a shorter length of stay (LOS).<sup>14</sup> Several factors have contributed to improved care and clinical outcomes of patients with hip fracture in the UK, including the following: in 2007, the British Orthopaedic Association in conjunction with the British Geriatric Society published *The Care of Patients with Fragility Fracture* (the "Blue Book") summarizing best practices and standards; development of the National Hip Fracture Database to audit compliance with the published standards; and the introduction of a national 'Best Practice Tariff' financial incentive in 2010 to comply with the published standards.<sup>15</sup>

The updated [hip fracture care standards \(Blue Book\) in 2021](#), highlights four pillars of care based on the Fragility Fracture Network's global call to action on fragility fractures, which encapsulate the orthogeriatric approach: (1) multidisciplinary management of the acute post-fracture period; (2) rehabilitation; (3) secondary prevention including fall risk assessment and osteoporosis management; and (4) national multidisciplinary alliances between mainstream relevant professional associations to promote policy change that enables the above three.<sup>15</sup>

## WHAT IS THE RATIONALE FOR ORTHOGERIATRIC SERVICES?

Excellent surgical care is very important in the acute phase. However, other important issues may be overlooked, such as the cause of the fall leading to the fracture, the presence of other medical problems, as well

as geriatric syndromes, including cognitive, psychosocial and functional issues. The estimated prevalence of cognitive impairment among older adults with hip fracture was 41.8% in one review.<sup>16</sup> Many patients with fragility fractures often have frailty and sarcopenia, both of which share close links biologically and clinically with osteoporosis and falls.<sup>15</sup> [Comprehensive geriatric assessment \(CGA\)](#) identifies and addresses these issues by developing a coordinated and integrated plan.<sup>17</sup> Frailty is important to identify in the setting of hip fracture as it has been associated with longer hospital LOS and reduced chance of returning home within 30 days.<sup>18</sup> In addition, some features of modern hospital care may put older adults at risk of further functional decline.<sup>19</sup> Attending to these issues is important in caring for hospitalized older adults. A service that provides surgical care coupled with CGA, often referred to as orthogeriatric care, is a logical model of care. The UK has led the way in defining the now-accepted standard of early orthogeriatric collaboration.<sup>12,20</sup> In Australia and New Zealand, orthogeriatric care models are recommended as standard of care.<sup>21</sup> In the USA, an orthogeriatric care model is conditionally recommended in geriatric patients with isolated hip fracture.<sup>22</sup>

Oftentimes, older adults with hip fractures have a combination of cognitive impairment, multiple comorbidities, polypharmacy, and frailty. Delirium is a common complication for hip fracture patients, present in up to 61%, which warrants multi-component preventative strategies and routine screening due to its associated morbidity.<sup>9,23</sup> The summation of these complexities in older adults with hip fracture warrant a multidisciplinary approach including standardized protocols. Table 1 highlights several of these important factors and strategies related to the care of hip fracture patients.

**Table 1.** Special considerations, medical complexities, and management strategies for the older adult admitted to hospital with hip fracture.

<p><b>THE FRACTURE</b></p>	<ul style="list-style-type: none"> <li>• Analgesia including peripheral nerve blocks</li> <li>• Timeliness of surgery</li> <li>• Anesthesia</li> <li>• Preoperative and postoperative order sets and care pathways</li> <li>• Surgical complications (non-union, AVN, reoperation)</li> <li>• Healing and recovery</li> <li>• Secondary fracture prevention and bone health</li> </ul>
<p><b>THE HOSPITAL SETTING</b></p>	<ul style="list-style-type: none"> <li>• Cost</li> <li>• Caregiver and social support</li> <li>• Allied health staff including multidisciplinary support</li> <li>• Early ambulation protocols</li> <li>• Early discharge planning</li> <li>• Rehabilitation</li> <li>• Follow-up care including FLS</li> </ul>
<p><b>THE PATIENT</b></p>	<ul style="list-style-type: none"> <li>• Preoperative optimization (hydration, analgesia, medical optimization, medication review)</li> <li>• Cognitive and mental health including delirium screening</li> <li>• Frailty and multi-morbidity</li> <li>• Fall mechanism and risk assessment</li> <li>• Post-operative medical complications (delirium, pneumonia, VTE, pressure ulcer)</li> <li>• Palliative care</li> <li>• End of life care</li> </ul>

AVN = avascular necrosis, FLS = fracture liaison service, VTE = venous thromboembolism

### WHAT TYPES OF ORTHOGERIATRIC CARE MODELS ARE THERE?

There are multiple ways that geriatric and orthopedic services can interact. In [several reviews](#)<sup>12,24</sup> on the benefits of orthogeriatrics and in meta-analyses, they have been grouped into the categories listed in Table 2, which we have adapted somewhat. The variants of the orthogeriatric model emphasize the need for early geriatric clinical care and early surgical management.

**Table 2. Orthogeriatric models of care**

<b>Model</b>	<b>Description</b>
<b>Usual/ Reactive Care</b>	Care is provided within an orthopedic ward with geriatrician consultation only upon request.
<b>Post-operative Geriatric Rehabilitation Units</b>	Peri-operative care is provided within an orthopedic ward by orthopedic surgeons who facilitate early post-operative discharge to a geriatric rehabilitation unit.
<b>Routine Geriatric Consultation</b>	Care is provided within an orthopedic ward with routine geriatrician consultation on older patients. In this model, the geriatrician acts as a consultant and not the most responsible physician. This is often a one-time CGA, but may involve follow up visits.
<b>Orthogeriatric Ward</b>	Care within a dedicated acute geriatric trauma ward, usually with the orthopedic surgeon acting as a consultant and the geriatrician being the most responsible physician. This reverses the structure of the 'Routine Geriatric Consultation' described above.
<b>Shared/ Joint Care (Co-Management)</b>	Integrated care model where the patient is within an orthopedic ward, but both the orthopedic surgeon and geriatrician share responsibility for the care of the patient. Usually, the most responsible physician is the orthopedic surgeon with the geriatrician and/or geriatric team providing ongoing advice for management and in some models, the geriatrician can write orders for non-surgical issues.

If interested in developing an orthogeriatric service, a suggested reading is Chapter 5 of Orthogeriatrics – The Management of Older Patients with Fragility Fractures by Falaschi and Marsh.<sup>15</sup>

### WHAT IS THE EVIDENCE FOR EFFICACY?

At least four meta-analyses<sup>25-28</sup> and a [review](#)<sup>29</sup> have been conducted directly addressing orthogeriatric models of care, and [one Cochrane review](#) considers inpatient geriatric consultation on surgical services more generally.<sup>30</sup> All meta-analyses compared orthogeriatric services to routine care.<sup>25-28</sup> All of these studies share similar conclusions. The initial meta-analysis by [Grigoryan et al](#) on different orthogeriatric models of care from 18 studies concluded that orthogeriatric collaboration was associated with a significant reduction in in-hospital and long-term (from 6 months to 1 year) mortality, with a relative risk (RR) (95% confidence interval) of 0.60 (0.43-0.84) and 0.83 (0.74-0.94), respectively.<sup>26</sup> [Moyet et al.](#), identified 18 randomized clinical trials (RCTs) with a mean age of participants of 82. They found reduced mortality in all patients studied with implementation of the orthogeriatric model compared to usual care, with an odds ratio (OR) for mortality of 0.85 (0.74-0.97). Subgroup analyses revealed that long-term (from 6 months to 1 year) mortality was also better with orthogeriatric care, with an OR of 0.79 (0.68-0.93).<sup>25</sup> Similar benefits of reduced in-hospital and 1-year mortality were found in a [recent meta-analysis](#) including 37 studies.<sup>28</sup>

Other benefits reported in meta-analyses, RCTs and observational studies include reduced health care costs<sup>31</sup>, lower rates of delirium<sup>28,32</sup> and lower rates of functional impairment.<sup>27,33</sup> There is mixed evidence for differences in LOS and time to surgery. Eamer et al., identified eight studies of CGA in surgical patients (predominantly orthopedic hip fracture) reporting associated healthcare costs. They found that CGA is cost-effective with improved outcomes compared to usual care with a weighted mean cost savings of \$3465 USD per primary patient admission for acute hospital admission.<sup>30</sup> One RCT demonstrated cost savings of \$5002 USD at 1-year follow-up.<sup>33</sup> A Canadian single-center, pre-post study of 571 patients demonstrated a mean cost reduction of \$4953 (p<0.001) per case in addition to a reduced LOS (6.3 days, P<0.001).<sup>34</sup> A [systematic review](#) of four RCTs investigating CGA for delirium prevention after hip fracture revealed a significant reduction in delirium incidence with a RR of 0.81 (0.69-0.94) in the intervention group.<sup>32</sup> Similarly, a recent meta-analysis found that orthogeriatric care was associated with a significant reduction in delirium with a RR of 0.81 (0.71-0.92).<sup>28</sup> In order to determine whether the positive outcomes seen in the studies in large centres can be generalized to community hospital settings, a retrospective pre- and postintervention single-site study was performed at a Canadian community hospital after the implementation of an orthogeriatric care

model for hip fracture patients. Although the incidence of postoperative delirium and length of stay were similar, there were improvements in several other key quality standards for hip fracture care.<sup>35</sup>

To date, there are no head-to-head comparisons of the various models of orthogeriatric care to identify if any specific model is more effective than the others. One meta-analysis favoured the orthogeriatric ward care model as providing the clearest beneficial results, however conclusions could not be drawn due to heterogeneity of the included studies and lack of sufficient RCTs.<sup>25</sup> The most recent meta-analysis by Van Heghe concluded that there is insufficient evidence to recommend one specific type of orthogeriatric care model over another.<sup>28</sup>

### WHAT ARE THE ESSENTIAL COMPONENTS OF AN ORTHOGERIATRIC SERVICE?

An orthogeriatric service needs to be considered in the context of the existing health care system. The history of the institution, physical space and resources available will dictate the type of service that can be provided. In some settings, this will be routine geriatric consultation on orthopedic wards, while in larger centres with more resources and adequate numbers of geriatricians, dedicated orthogeriatric units may be considered. In community hospitals without geriatricians, it is important for healthcare practitioners to be familiar with geriatric principles when caring for patients with hip fracture. Furthermore, in the context of rapidly expanding availability of virtual care, it may become feasible to remotely consult a geriatrician in this scenario.

Good basic surgical care is of course essential. In addition to this, the general principles of inpatient care of older adults are also critical<sup>17</sup>, including attention to the physical environment, such as uncluttered hallways, early ambulation protocols, adequate attendant staff, on site physiotherapy, provision of gait aids and sensible footwear, hearing and vision aids, optimal pain control, medication review, and assessment of cognition, functional status and social factors. Additionally, standardization with the development and implementation of best practice order sets and care pathways (preoperative and postoperative) with input by geriatricians is important. Secondary prevention of fractures with initiation of osteoporosis treatment is also important. Treatment can be improved with the use of the [fracture liaison service \(FLS\) model](#), which is a cost-effective, coordinator-based, secondary fracture prevention service that has been shown to reduce hip fracture mortality and secondary fracture.<sup>15,36</sup> A flexible care plan should be developed in conjunction with patients and their families. Finally, early discharge planning that incorporates a smooth transition back to the community or alternate living arrangement is essential. This will usually include ongoing outpatient rehabilitation.

### WHAT ARE THE FEATURES OF A SUCCESSFUL ORTHOGERIATRIC SERVICE?

Sustaining services over time can be challenging necessitating ongoing review and quality improvement. [Wong et al.](#) outlines the elements necessary to develop and sustain a cross-specialty collaboration model.<sup>37</sup> Good relationships between orthopedic surgery, geriatric medicine and other consulting services is important, with a clear delineation of duties and responsibilities, which are reviewed over time. An appropriate physical setting is needed, adequate staffing of skilled nursing and allied health must be ensured over time, and early ambulation protocols enforced consistently, with clarity as to which staff facilitate patient ambulation at which times. The ward also needs to interface with the rest of the health care system to ensure smooth transitions in care. A [meta-analysis](#) including 21 studies on orthogeriatric clinical care pathways (CCPs) following hip fracture demonstrated that inpatient CCPs that extended to the outpatient setting resulted in greater patient improvements in physical function and health-related quality of life.<sup>38</sup> Communication with community providers, including the primary care physician and home care service providers, is needed. For those with ongoing mobility or other geriatric issues, a system is needed to ensure post-discharge follow-up. In most cases, ongoing rehabilitation will be needed, with a need to establish whether this may be optimally achieved in the home, ambulatory care setting (e.g., Geriatric Day Hospitals or Geriatric Clinics), or in an inpatient rehabilitation setting. A recent [Cochrane review](#) found that in a hospital inpatient setting, there is moderate-certainty evidence that multidisciplinary rehabilitation results in fewer cases of poor outcome (death or deterioration in residential status) compared to usual care at 6 to 12 months' follow-up. There is currently insufficient evidence to support discharge with multidisciplinary home rehabilitation being better than usual care.<sup>39</sup>

## **CONCLUSION**

Hip fractures are common in older adults and are associated with high costs and numerous adverse outcomes including high mortality. Delivering high quality care to older adults with traumatic orthopedic injuries is critically important and is best achieved by a multidisciplinary approach including geriatric principles. Orthogeriatric models of care that combine inpatient orthopedic services with CGA have been shown to be cost-effective (often generating cost savings) while improving patient outcomes such as reduced mortality and delirium. The format of the orthogeriatric service depends upon the local history, existing relationships and the resources available.



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