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Secondary Hip Fractures among Aging Adults with a Previous Hip Fracture History: Cumulative 50 Year Overview, Analysis, and Possible Antidote as Observed from 1974-2026 Data Sources

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Abstract

Hip fractures, which remain an immense public health concern, have been subject to study and prevention efforts for many decades, but with limited success in averting either incident, second or subsequent hip fractures, commonly attributed to a combination of age related proclivity to fall, low bone and muscle mass. This review examines second hip fracture incidence rates and determinants of this serious functionally debilitating injury as observed over time remains a current 2026 public health concern. It specifically explores if more preventive efforts are currently warranted in this regard, and in what respect, if indeed, more frail older adults are living longer, but may be in excessively poor health, fearful of moving or falling, malnourished, weak with poor balance, or depressed. Based on what is published, it is concluded 1) second hip fracture incidence rates remain considerable, especially among those who are frail with osteoporotic bone disease, poor vision, heart/or cognitive conditions, plus those with muscle deficits of the lower limb, live alone and have a falls history; 2) studies to identify possible mitigation approaches appear promising in this regard, along with more routine efforts to minimize falls risk and bone attrition.

Introduction

In recent years, and despite some evidence of declining hip fracture rates in some spheres, it appears hip fractures continue to pose one of the most serious health care challenges facing policy makers, health care organizations, and older adults desiring to live independently in the community, rather than in the nursing home. Indeed, although some evidence of a decline in hip fracture prevalence has recently been reported [e.g., 1-4], the injury remains an ever present and potentially unwarranted cause of severe disability, excess morbidity, reduced life quality, post surgical hospital complications, and premature mortality among many older adults [4-8], especially men [3], and those of higher ages [9]. Moreover, according to some, it is just as likely that the annual incidence of hip fractures could increase, rather than decrease over the next several decades [10], even though certain pharmacologic drugs may limit hip fracture risk. Due to an increase in the numbers of adults living to higher ages [9], a group not well studied, but where frailty and bone fragility prevalence rates continue to rise [11, 12], data projections may be underestimates if they do not commonly account for the fact that a 'first' hip fracture incident may be overlooked if the older adult does not have access to a hospital environment where data are collected and housed, or where only surgical cases are reported, rather than non surgically treated cases. In addition, falls, the second leading cause of an unintentional injury in adults 65 years or older, and that can lead to death as a result of a hip fracture may be overlooked as a factor of cost concern, and since, December 2019, possible COVID-19 acute and long term unresolved infections and related restricted access to health services or long waits for consultations. Costs may also be underestimated if they do not include actual hip fracture incidents occurring in isolated communities, where some adults may well have fallen and been unable to access help, or too fearful or ill to be admitted to a hospital. As well, even in areas where hip fracture rates have reportedly remained stable over 10 years, prior to COVID-19, rates of hip fracture did not appear to be falling in all locations [13], and recently appeared to be increasing among older women in Asia [5], China [10], Taiwan [14], Saudi Arabia [15], United States [16], and Costa Rica [17] and where the related loss of independence, mortality, and morbidity appears substantively and greater for women than for men [3, 18]. Rates may also depend on multiple intrinsic as well as extrinsic factors including the location or region studied, the assessment tool and cut -off risk indicator levels, the availability of services, and whether data are systematically collected, accurate and up to date [19, 20].

At the same time, clearly stressing the need to continue to examine hip fracture trends, are increasing numbers of older adults at risk for falling, and sustaining an acute hip fracture, or a new fracture there-after, which may be in the same location with a tendency to greater displacement or instability [21]. Further, while Dolk in 1989 [22] predicted the frequency of sustaining two hip fractures over the course of an individual's lifetime could reach 20 percent-this may have been an underestimate because the life span at that time was considerably lower than it is in 2026 and older adults [such as those older than 80 years of age] may not have been studied systematically. In addition, it is possible poor rehabilitation or oversight on remediating the causes of the initial fall or repeated falls may predispose the high age adult to a second hip fracture on the same or opposite side of the initial fracture, for example persistent bone fragility or undetected muscle imbalances or both. According to Shroder *et al*. [23] the risk of incurring a third hip fracture is not one that can be overlooked and in 1000 men appeared as high as 8.6 and at rates of 9.8 per 1000 for women, per year, or even higher [24].

Additional research reveals ipsilateral second hip fractures may include those that involve the trochanteric region that may not have been operated on, or in the case of internally fixated hips, may be

attributable to the suboptimal placing of the surgical screw(s). Rarely, they may also occur after removal of internal fixation. However, in the study conducted by Shroder *et al*. [23] only 8 percent of second hip fractures occurred on the same side as the original fracture, while 92 percent occurred on the opposite side. Other data showed that 62 percent of those cases presenting with a femoral neck fracture and 72 percent of those with a trochanteric fracture, the two predominant hip fracture sites, were observed to have a preceding contralateral fracture of the same type. The mean time interval between the two fractures at the time of study was 3.3 years (range 5 days-14 years); although 20 percent incurred a second fracture within one year following the initial fracture, regardless of gender or fracture type, implying there is a very narrow window of opportunity to avert this event of an increased risk of a second hip fracture, which was shown statistically to be highly significant for both genders, but more marked for men.

Yamanashi *et al*. [25] who followed 714 hip fracture cases prospectively showed a second fracture, if it occurred, took place in general within eight months of the initial fracture, and was generally of the same type and strongly associated with the presence of senile dementia and/or a Parkinson's disease diagnosis. It was not clear if these conditions had been treated with bone damaging drugs or others that may impede cognitions and motor control excessively along with the ability to avert a fall.

Nymark *et al*. [26] who assessed the average time period that commonly evolved from a first to a second hip fracture, if it occurred, was highest within the first 12 months following a first hip fracture. It was suggested preventive strategies at the time of a first fracture were strongly indicated as did Lönnroos *et al*. [27] who found the incidence rate for these second fractures were indeed quite high at one year post hip fracture surgery and even higher in the second year thereafter. Long term vigilance remains crucial however, as there may yet be a substantial risk of a second hip fracture among older adults within five years of the initial injury due to the persistence of a state of poor functional status [28], and that occurs more readily than not among those who survive unless concerted efforts are made to mitigate this risk [29].

However to date, despite the implementation of many community wide falls risk intervention programs in recent years, as well as the administration of bone mass building anti-osteoporisis medications, no strategy to date has proved widely successful in any sphere. Because the data span many decades and we may have overlooked some aspect of promise in this regard, we specifically sought to ascertain if indeed this is an area of current as well as future concern, and if so, what can be done in the present as well as future to avert an incident hip fracture epidemic as well as to foster or restore functional recovery post-hip fracture surgery in the case where a frail hip fracture patient has to undergo surgery.

The topic of second hip fractures and their known determinants was specifically highlighted and past as well as novel trends or potential intervention and prevention insights were specifically sought.

Although not as prevalent as primary hip fractures, second hip fractures may account for up to 15% of all hip fractures and immense suffering for many. Consequently, Guy *et al*. [30] proposed that concerted efforts be made to offset these events via early and consistent mitigation efforts, to avert related health costs, which may be greater than a single fracture event [31]. In addition, poorly or sub-optimally treated hip fractures that result in fractures other than that at the hip will likely add to the ensuing level of functional disability that arises post hip fracture, and may foster an even more debilitating state unless addressed in a timely way. Hospitalizations also expose elderly patients to infectious agents even if timely surgery and rehabilitation strategies for restoring functional recovery post-hip fracture surgery are available, thus more preventive efforts to secure the health and safety of

the older community dwelling adult in and out of the hospital remains strongly indicated.

Method and Procedures

To fulfil the aims of this report, all pertinent full length published studies in the English language detailing second and incident hip fractures as housed in the **PUBMED, GOOGLE SCHOLAR,** plus **PubMed Central** data bases over the time periods January 1 1970-May 31 2026, employing the key words: '*Hip fracture*', '*Older adults*', *'Second hip fracture'*. Summarized are pre and post pandemic findings pertaining to second hip fractures as published in peer reviewed research journals over this lengthy period during which researchers have shown considerable well founded concerns related to this topic area so as to discern trends and imperatives in this regard. Mitigation offered in the context of the preventive directives against second hip fractures were also sought in the desire to conceptualize how or reduce the immense hip fracture burden and its projected increase in incidence and prevalence in the near future. Those articles listed but failing to discuss first or second hip fractures or second hip fractures in the elderly, as well as those discussing fractures in the context of specific diseases or peri-prosthetic fractures, were excluded.

Results

Among the relevant studies published to date, while not all countries have reported on this topic, those that have including China, Costa Rica, Denmark, Finland, Ireland, Japan, the Netherlands, Norway, Spain, Turkey, the United States, the United Kingdom, and Taiwan appear to present findings that are quite comparable as a whole as regards incidence rates and possible risk factors for first and second hip fractures, regardless of their non-uniform analytic approaches, study periods, and follow-up durations [32].

Most detailed articles however, stem from research reports that date back to the 1970s up until 2020, but show much less visibility to date in 2026. In this regard, many current hip fracture reports focus on surgery repair as the treatment strategy of preference and advocate possible best practices for doing this, but very few refer to secondary fractures of the hip joint, and even in the case of primary fractures very little focus on their prevention in any regard. However, for more than 60 years, as discussed per Atik *et al*. [32], this current topic of interest that has prevailed since at least 1974, still remains problematic in 2026 and does not appear to have improved in any way or to any meaningful degree. This is possibly attributed to the presence of a persistent senile osteoporotic state, and related ongoing systemic weakening of the skeletal system among some older adult and not others [33, 34] that may result in a cumulative incidence rate of second hip fractures of 5.08% at one year, and 8.11% at two years after the first fracture and especially among those using psychotropic drugs. It has been further concluded however, that this situation will not improve without efforts to assure adequate and timely treatments to minimize osteoporosis, as well as more attention toward reducing inappropriate drug usage in the vulnerable older adult [27], as well as possibly targeting those exhibiting senile dementia and Parkinson's disease preferentially [25].

As affirmed by Chen *et al*. [28] who found almost 10 percent of hip fracture cases may develop subsequent hip fractures, as well as related increases in age specific mortality rates, those at most risk appeared to be women, and those who were obese, or had a cardiovascular condition. In addition, prolonged psychotropic medication usage, and poor vision were common risk determinants. In a systematic review of 13 case control studies conducted by Liu *et al*. [35] concerning risk factors for a second contra-lateral hip fracture this group indicated that among the risk factors in this respect were age, being female, having poor vision, a cardiac disease history, dizziness, and respiratory problems. Additional

work by Egan [36] and Matani *et al*. [37] similarly identified older age, cognitive impairment, low bone mass, impaired mobility, plus vision, having a falls history and poor self-perceived health, dementia, and respiratory disease tended to heighten the risk for a second hip fracture.

As a result of these findings, and those of Lee *et al*. [38], early community based falls and fracture prevention program efforts plus ongoing support for extended time periods of post hip fracture rehabilitation are indicated to offset a probable 2-7 fold risk of a second hip fracture within 6 years, plus a higher mortality rate at one year compared to those with single hip fractures. This outcome prevails in particular if the primary fracture patient is a 55- 64 year old woman [39, 40] who has not received pharmaceutical treatments to counter osteoporosis, an intervention recommended by Kok *et al*. [41] to help reduce the incidence of primary as well as second hip fractures [42] such as vitamin D and calcium supplements.

In sedentary aging societies in particular, therefore, we would argue, practitioners and agencies must remain vigilant in this respect, because as indicated by Olmsland *et al*. [43] who found total hip fracture rates declined in both genders between 1999-2008, the rates of second hip fractures did not change. Bynum *et al*. [44] concluded secondary fracture prevention strategies that take a population perspective are indeed strongly indicated, to avert the possible impact of a second hip fracture that accounts for an increasing proportion of hip fracture surgeries, more demand on shrinking health care resources, poor outcomes and excess mortality rates [30, 38].

As per Sheik *et al.* [45] efforts to improve screening for hip fracture patients at risk for subsequent fractures may be helpful, as may attention to older adults with signs of dementia, chest or urine infections and the presence of multiple chronic illnesses.

The disabling nature of the second hip fracture in all venues studied may however be difficult to avert in the event bone protection medication regimens have not been implemented in the past or peri operatively to any degree [46, 47]. Indeed, cases deemed to have sustained a fragility fracture showed of those who survived surgery, 12.4% sustained a second hip fracture [48]. The predisposing factors in this regard were identified as: being female, having a high bone fragility score, and a low physical capacity level. Vitamin D recommended for treating osteoporosis at safe levels was observed as having been implemented in only 24% of cases and 42% had ionized calcium levels below the reference range. The risk of death is higher after the second hip fracture, regardless of age and may be due in part to the lack of adequate post-surgical anti-osteoporosis medication recommendations or similar approaches at any time prior to the index hip fracture incident.

Zidrou *et al*. [49] who confirmed a second hip fracture can indeed occur quite commonly among older adults who have already suffered an initial hip fracture, indicated the key determinants in this regard were advanced age, being female, living alone, being demented, having a chest and/or urinary tract infection, chronic heart failure, and peripheral vascular disease. Other determinants of debilitating second hip fractures are cardiovascular conditions and signs of dementia [50, 51].

Unsurprisingly, older adults who incur a second hip fracture are found to have an increased mortality rate when compared to those with a single fracture [34, 52]. As well, they are more than likely to have exhibited a history of fragility fractures, the need for assistance when walking outdoors and a history of falls, implying some, if not all secondary hip fractures may have been prevented by intervening accordingly. However, while high age adults who sustain a first hip fracture are at high risk of fracturing their other hip, preventive therapy is often not forthcoming [53]. Yet even though many risk factors for a second as well as primary hip fracture are well documented, they do not appear to be clearly understood

or integrated into efforts to mitigate against the risk of sustaining one or more hip fractures. These include the role of declines in bone mineral density, muscle size and density, and a possible lack of strategies other than anti osteoporosis interventions to meet these health challenges [54].

Ren *et al*. [61] who conducted a systematic search of hip fracture determinants showed significant risk factors for this included having a reduced hip muscle density, a reduced bone mineral density at hip femoral neck, and intertrochanteric regions, osteoporosis, signs of muscle degeneration and cognitive impairments, and calcium/vitamin D deficiencies. Among these, muscle morphology impairments, and calcium/vitamin D deficiency were deemed key deterministic factors.

Blattner *et al*. [63] who investigated the incidence rate, timing, survival time, mobility, and daily activity outcomes of second contralateral hip fractures using a matched pair analysis, found that of 1,933 patients, 148 (7.6%) sustained a second contralateral hip fracture on average within 2.2 years, with 40% occurring within the first postoperative year. Time to death after the second fracture was significantly lower for the cohort of patients with a single hip fracture (18% vs. 33%, $p < 0.03$) and within two years: 37.9% vs. 48%. Patients with second hip fractures demonstrated a significantly lower Barthel Index (66.7 vs. 77) and Parker Mobility Score (5.39 vs. 6.84) at follow-up, indicating reduced independence and mobility. Discharge to rehabilitation (possibly indicating slow recovery) after the first fracture was associated with a higher risk of subsequent fracture (58.1% vs. 49.3%). The authors concluded second contralateral hip fractures are under- recognized events that significantly reduce long-term mobility, independence, and survival time post-fracture within two years after the initial fracture, thus highlighting a critical window for targeted monitoring, falls prevention, and optimized osteoporosis management. They further concluded early identification of high-risk patients, especially those discharged to rehabilitation, was likely to be essential in efforts to mitigate any projected excess functional decline and premature mortality risk.

Tao *et al*. [77] propose since the level of fall risk perception among elderly hip fracture patients may only be moderate, clinical nursing staff may need to tailor interventions based on the patient's intrinsic perceptions, as well as their heterogeneous profile, in order to provide precise targeted treatment strategies to reduce their' falls risk and ultimately the actual risk of recurrent injurious falls.

In sum, despite almost 6 decades of research, including multiple efforts to identify upstream risk factors for incident as well as second hip fracture injuries, these remain sufficiently common and continue to cause sizeable percentages of older ambulatory adults, excess disability if they survive surgery [6, 55]. This finding is not spurious, but remarkably consistent across multiple venues housing the most advanced orthopedic facilities in multiple regions of the globe renowned for their advanced health care and surgical practices. What is apparent is that among the reasons examined to explain this possible incident as well as second hip fracture risk, is not the surgical processes per se, but the possible failure to provide comprehensive multi dimensional preventive care approaches pre as well as post-hip fracture surgery, along with the patients' functional and nutrition status, and ability to understand their important role in the recovery process [6, 55, 56, 58, 77, 78].

As such, and among possible solutions, preventive strategies at the time of the first hip fracture that aim at both averting any untoward immediate effects, as well as fostering those with disabling impacts may be desirable [26] and appear warranted for periods of up to 12 months in the case of men and 19 months in the case of women. Post operative rehabilitation and efforts to heighten activities of daily living and nutrition and gait [78] are especially indicated among, other approaches as outlined in Table 1.

In addition to their annual health reviews, older adults might undergo bone density assessments, and be

Table 1. Possible approaches that might be harnessed to foster the prevention of incident as well as subsequent hip fractures among older adults living in the context of a community setting.

Possible Hip Fracture Mediators	***Preventive Recommendations***
Balance capacity	Foster balance/ambulation training
Bone mineral density attrition/fragility	Optimize bone health, prevent trauma
Cardiovascular disease history	Monitor cardiac status periodically
Cognitive status	Foster self- and coping efficacy, personal agency
Falls history/risk profile	Vigilance, education, control comorbid illnesses
Fear, depression	Counseling
Health status	Foster stress control, mobilize social support
Medication usage/polypharmacy	Careful medication usage
Lifestyle	Avoid alcohol, unsafe outdoor/indoor activities
*Overall weakness/mobility losses	Muscle strengthening/weight-bearing exercises
Nutritional deficits	Assess, provide access to desirable nutritional foods
Post-operative sarcopenia	Monitor, intervene accordingly
Relative cortisol insufficiency	Stress management
Vision status	Eyewear reviews/referrals/lighting attributes
Vitamin D status	Assure safe levels
Sleep challenges	Avoid sleep/hypnotic medications, naps
Smoking	Encourage non-smoking
Poor understanding of risks/solutions	Health education
Weight status	Avoid excess/suboptimal weight
Zinc status	Ensure especially post-operatively

* Weak muscles may decrease the force required to fracture a hip + may imply a slower than normal reflex response and less protection of the underlying bone. Adapted from: [8, 12, 27, 53, 56-60, 78, 80, 82-84, 86, 87]

evaluated periodically for any excess falls or possible fracture risk due to associated progressive muscle mass and strength declines. They might also be monitored for any regression in health status, especially if the older adult is undernourished, and of low body weight, and receiving drugs to counter depression or sleep challenges [20]. Where applicable, the 'at risk' older adult should also be strongly encouraged to avoid tobacco or excess alcohol usage, and to engage in regular exercise and recommended fall prevention programs, regardless of extent of probable falls risk [20]. In addition, referrals to endocrinologists or other osteoporosis specialists should be advanced, if warranted.

In the interim, it appears timely persistent primary prevention efforts are potentially imperative in efforts to minimize the overall burden of hip fractures among older members of society, and especially their oftentimes devastating impacts and need to return to surgery within one year, as well as possible recurrent or subsequent hip fracture occurrences among this population [61-67, 89]. To this end, in addition to more widespread falls prevention programs, prompt emergency, surgery, and comprehensive post operative care, including prevention approaches delivered both at the bedside as well as the home or community are indicated now more than ever, especially among the frail or pre frail [68], prior fall-

ers, and older underweight tall women [89, 90].

Discussion

Although the topic of hip fracture injuries among the older adult population has been studied for several decades in an effort to prevent these oftentimes devastating injuries, a fair percentage of current reports indicate this condition remains a highly prevalent one, as well as a severely debilitating one, if indeed the older adult survives surgery. Especially problematic are multiple negative post operative health outcomes including the risk of secondary hip fractures. However, even if hip fractures as a whole are the most costly forms of fracture occurrences [79], very little progress in averting their incidence prevails. Well designed targeted primary, tertiary as well as secondary preventive efforts are however, likely to offset the risk of an older adult incurring this unwanted debilitating injury and its attendant immense social and personal costs [79].

The possibilities are quite numerous here in our view as conceptualized in Table 1. For example, those older adults with multiple co existing health conditions who appear at greater risk for long term disability in the face of one or more hip fractures may benefit from a protective health promotion program starting in early adulthood as well as comprehensive falls prevention efforts. Moreover, loneliness and depression determinants can be treated as indicated, as can malnutrition, frailty, bone fragility, sleep disturbances, and cognitive challenges that can underpin first as well as second hip fractures. Indeed, as discussed by Jain *et al*. [50], several current studies have shown older adults with fractures may also present with medical comorbidities such as diabetes, stroke, and hypertension that warrant control where present, as well as weakened muscular and bone systems, because they may otherwise be especially vulnerable to injury and recovery complications, if untreated or ignored.

In this regard, it appears many at risk older adults residing in the community may yet sustain a preventable second hip fracture, if dedicated care resources and efforts to prevent any progressive muscle and bone mass losses are overlooked, along with the risk of frailty, poor balance, and gait disturbances [67, 68, 72]. Physical activity, may hold the key here to prevent chronic disease flares, and fall injuries attributable to poor motor control and/or unrelenting depressive feelings.

While the reports reviewed were not all inclusive, it seems safe to say global trends in hip fracture prevalence will persist unless the need for future preventive and intervention approaches is recognized in a timely manner, regardless of country of origin. However the available data indicate little change between 1970 and 2026 in terms of documented second hip fracture occurrences and their severity, although these vary from eight to fifteen percentage points over time. In particular, all reports are largely in agreement that mortality rates are increased in the presence of a second hip fracture, regardless of fracture site. However, a role for malnutrition, social isolation factors, pain, and possible multiple cognitive, muscle and bone mass factors that are potentially amenable to alteration are not well articulated though, or unified, if at all in most studies, regardless of fracture type.

Indeed, the most frequent determinants observed and reported in the literature and highlighted in Table 1 and Figure 1, including poor health status, vision, muscle weakness, and falls injuries are attributes that are possibly somewhat preventable or modifiable [69]. In addition, focusing on the role of comorbid conditions, cognitive disorders, subnormal cortisol stress responses [80], as well as the impact of psychotropic drug usage, which again are reported very sporadically, may prove of further benefit in multiple ways. In this respect, recent data have indicated those older adults who sustain subtrochanteric hip fractures as well as those older adults presenting with a high risk profile for subsequent fragility fractures, should probably be selectively monitored for extended periods after any hip fracture surgery

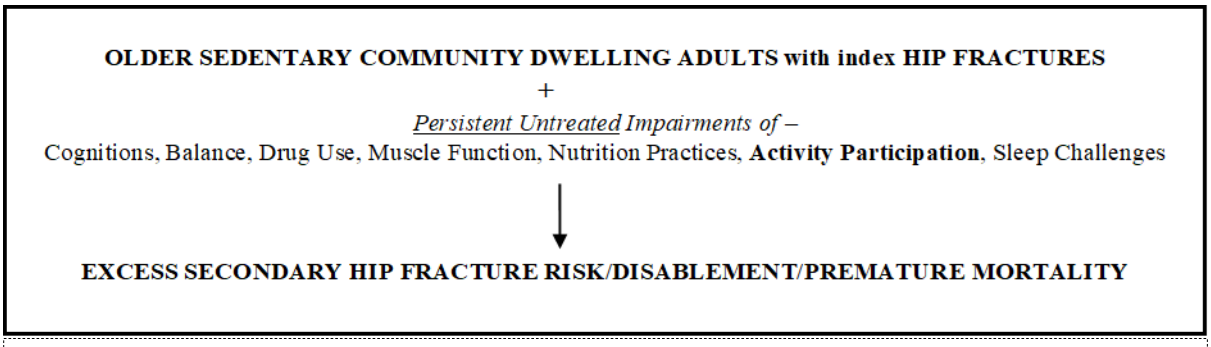

Figure 1. Schematic representation of possible adverse effects of poorly treated hip fractures on recurrent hip fracture risk among older community dwelling older adults.
Extracted from sources 20-25

Figure 2. Possible hip fracture preventive benefits of physical activity participation

[64, 66, 70], possibly for at least five years [71]. As well, ensuring their homes are safe and bone building resources are advanced thoughtfully appear strongly indicated [10] alongside routine muscle assessments [72] and limiting excessive drug use, and monitoring postoperative cortisol levels [80].

In essence, from the outset, it appears, continued vigilance in the realms of primary, secondary and tertiary prevention is needed to help the aging adult to maintain an optimal health status and activity level, along with any ongoing rehabilitation needs presented by a hip fracture incident. Here, one possible mutual goal of paramount importance in the context of averting hip fracture incidents, primary or secondary, is a heightened falls risk consequent to muscle strength losses that negatively impact successful joint protection and gait, and foster a state of post falling vulnerability as outlined in Figure 2 [73-75]. Alternately, because weakness can hasten bone demineralization, as well as diminish protective response across injured as well as uninjured limbs, as well as coverage of the underlying bone, suboptimal related attempts to offset hip fractures at any stage may fail, especially in the face of pre-existing co -morbidities, or having a falls and fragility fracture history [84].

Moreover, it appears a sole reliance on passive strategies in this regard may have little to no benefit on the prevention of one or more hip fractures and falls [81], for example if the older adult is deemed a

recurrent faller due to dementia [89], or is consistently exposed to polyphamacology [82], or suffers from untreated osteoporosis [76] or cardiovascular disease [73]. In addition the failure to avert muscle atrophy due to sedentary behaviors, may hasten hip fracture occurrences and magnitude in frail vulnerable high age adults [65, 73].

On the other hand, in addition to heightened geriatric care, much needed efforts to minimize the multiple possible burgeoning hip fracture societal costs, public health organizations and personnel can potentially help enormously by encouraging safe forms of physical activity participation and exercises that promote muscle strength, regardless of health status [85-88]. Older adults at risk for frailty, who avoid exercising due to pain and falls fears, and those admitted to and operated on in a hospital setting and exhibiting vitamin D and calcium deficiencies should be targeted as well [75, 76, 84, 86].

Until then, if more is not done in a timely, insightful, and far-reaching committed manner in this regard, the excess suffering currently prevailing among many older adults is likely to escalate accordingly for years to come.

Key conclusions

Despite the limitations of this report and immense gaps in the literature, we believe this overview spanning a 50 year+ time period supports the view that surgery alone for repairing an index hip fracture among older adults, is necessary, but not sufficient to offset future excess debility and mortality rates attributable to subsequent fractures found to occur in sizeable numbers of cases.

In line with the expressed consensus on the gravity of incurring a hip fracture by many, if not all researchers, we conclude:

- This situation may yet be compounded as adults live to higher ages, but with high levels of associated chronic health challenges both physical and emotional.
- In addition, we conclude that until more research prevails to recognize and identify modifiable risk factors and their attenuation, concerted multi pronged carefully construed personalized preventive efforts pre and post index hip fracture surgery while appearing strongly warranted, especially among older adults deemed at risk for frailty or who are already frail, may yet fail.
- Moreover, to avert excess human and fiscal costs among the first and second hip fracture population, we conclude more concentrated health promotion efforts that are part of health maintenance programs in early adulthood, plus carefully construed long term post index fracture targeted multi pronged rehabilitation and follow up assessments are strongly recommended.
- In this regard, we further conclude high risk older adults living alone in the community, especially those with multiple chronic diseases and/or a low bone, muscle, and body mass, plus those living in unsafe housing, or with cognitive challenges should be specifically targeted sooner rather than later.

To achieve success, it appears safe to conclude, regular physical activity participation potentially offers the most beneficial preventive hip fracture path at all stages of aging and is consistent with the documented role of multiple muscle and bone attrition related changes that may fail to avert falls injuries on one occasion, as well as possibly on multiple occasions.

Closing remarks

Among the many related remediable hip fracture risk factors, low physical activity levels appear especially important to counteract its disabling impacts, which includes disability costs, nursing care, reha-

bilitation care and surgical costs that are predicted to rise by 2050. By contrast, it appears physical activity participation can help to reduce the prevalence and excess disability of hip fractures occurrences and should be strongly encouraged across the spectrum of aging, as well as among 'high risk' and/or actual hip fracture populations no matter where they reside.

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