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# Hip Fractures and Type 2 Diabetes

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## Abstract

Type 2 diabetes, a largely adult onset form of this disabling condition, is one that appears increasingly present among many older adults, who are also at high risk for osteoporotic as well as non-osteoporotic hip fractures. This article covers observations in this respect that originated largely in 1976 and that have continued to emerge in 2026 albeit to remain unsolved and pervasive. Specifically sought were data as to its current threat for the older adult as well as the degree to which risk factors are addressed or could be. Also examined were ideas past and present as to how to prevent and treat a hip fracture in this population in the face of type 2 diabetes, given that a persistent proportion of hip fracture cases among older adults can be traced back to this condition, as well as age associated muscle and bone structural changes that might be mitigated or reversible. This article does not negate a role for pharmacologic interventions here, but tries to extend and offer a vantage point that may be of value to clinicians as well as researchers interested in optimizing or reverting modifiable adverse diabetes risk outcomes, such as hip fractures, so as to promote healthy aging and a positive life quality among the elderly in the face of disabling chronic type 2 diabetes.

**Key words:** Bone, Falls; Hip Fracture; Muscle; Postural Control, Prevention; Type 2 Diabetes

## Background

Hip fracture injuries are a well-established prominent cause of premature and excessive morbidity, as well as mortality among a sizeable percentage of the aging population and one where older adults with type 2 diabetes, an increasingly prevalent health problem among the older population, are incrementally at high risk [1-5]. This may be because the condition commonly affects multiple organs and body systems of the older adult, and does so more profoundly at the higher ages, as opposed to type 1 genetic or autoimmune diabetes that may be longstanding and less impacted by the added disadvantage of age, and at a time where multiple body systems are generally being steadily compromised.

In addition to the well being of older adults being an increasingly relevant public health concern, the costs of unanticipated injuries alone among the frail as well as the obese must be beseen as a major deterrent to the goals of successful aging and health for all goals. This brief updates and summarizes what has emerged in this regard as far as the topic of hip fractures is concerned and whether there is any magnified cause for concern in the case of the older type 2 diabetes case, for example, as far as surgery can be conducted, as well as actual surgical outcomes upon which longevity and life quality may depend, but is a situation often exacerbated by diabetes determined post surgical complications. Based on the most recent data in the literature, the key topics discussed in this umbrella review are hip fractures and their relationship to type 2 diabetes, why they are of import, who is affected, what are the risk factors, and potential prevention strategies to offset hip fracture prevalence and severity among the older adult population.

This effort was undertaken given the immense numbers of hip fracture cases we have encountered in a high quality setting where income is not a factor, but where survivors rarely returned to their former lives, but rather incurred further often progressive health challenges, including secondary hip fracyures. This was apparent even though this topic is quite well studied and shows strong agreement about the adverse impact of diabetes on musculoskeletal health status, when compared to physical status and glycemic control issues alone. We hypothesized that older adults with type 2 diabetes who remain at higher risk for falls including non-injurious skeletal falls [9] would continue to incur hip fractures at a rate greater than those who are disease free, especially if insulin dependent, despite an immense data base and many medical advancements that have accrued [9]. Moreover, with few signs that type 2 diabetes correlates are being addressed in primary care, we anticipated researchers would continue to observe poorer health outcomes even

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the face of advanced hip fracture repair surgical solutions. Moreover, this adverse series of events would persist as of 2026 despite a well articulated prior need for more vigilance against this debilitating health condition that was raised previously by us and many others [eg., 6-8].

The specific questions posed here were:

1. Is there a consistent relationship between the presence of a type 2 diabetes diagnosis and the risk of incurring a hip fracture in diverse aging adult populations?
2. Is the literature on diabetes self-management focused to the same degree on preventing disabling falls and subsequent hip fractures compared to articles on glycemic control alone?
3. What are the risk factors for hip fractures among type 2 diabetics and are adults with diabetes who incur one or more hip fracture likely to experience worse outcomes than those with no diabetes?
4. Is there a concerted effort to translate what we know about the link between type 2 diabetes and hip fractures into meaningful clinical research and practice realms?

We have not focused on the remediable underpinnings of type 2 diabetes here, such as the presence of lifelong excess body weight, but assumed the disease is already manifested.

# Methods

Data sources sought were those that might provide topical information and interrelated data on type 2 diabetes origins, type 2 diabetes and hip fractures, the possible causes of hip fractures in general, as well as among type 2 older diabetics, and the implications of this specific health condition for preventing hip fracture occurrences and severity. Data sources used were those published in the English language and covering the years 1976-2026, located in Academic Search Complete, Google Scholar, PubMed Central, and Science Direct which yielded many articles housed in PUBMED using the key works Hip Fractures, Type 2 Diabetes [Mellitus], Type 2 Diabetes and/or Hip Fractures as applied to aging adults. Due to the diversity of the literature and lack of focus with the exception of medical procedures, a meta-analysis of preventive efforts to obviate type 2 diabetes in its own right or as a falls correlate that commonly predates hip fracture incidents was not possible. Rather, a narrative overview of the data as derived from clinical studies, and systematic reviews as to the causes, consequences, and possible control of the hip fracture risk in type 2 diabetics was conducted. We chose to focus on type 2 diabetes as many of its underpinnings appear preventable, rather than pre-determined, and only on hip fractures. Data on fractures in general were excluded, as were hip fracture studies in general and specific types of hip fracture. The environmental determinants of hip fractures and type 2 diabetes were not discussed or sought. The term type 2 diabetes was used rather than type 2 diabetes mellitus, and which are analogous terms

**Synopsis of Overall Findings**

***Type 2 diabetes***

Type 2 diabetes is a chronic progressively destructive health condition affecting the ability to utilize sugar effectively, and is often traceable to behaviors adopted in early life in the west in particular, its manifestation is most profound with aging.

Although possibly not inevitable, as indicated by 9844 related citations on this topic alone since 1983, as posted on PUBMED as of August 19, 2026, type 2 diabetes remains a potentially potent functional disabler of the older adult. In addition, in spite of volumes of research, type 2 diabetes is a condition increasing in prevalence, and one likely to continue to affect millions of the burgeoning aging cohorts observed to be emerging incrementally and globally and highly adversely [6-9, 12, 13], thus remaining a huge costly challenge in any resource limited environment.

***Hip fractures***

For more than 50 years, ample research has shown hip fractures that commonly involve damage to one of three predominant local bone sites of the proximal femoral bone, tend to occur largely in older adult populations, where they may yet lead to premature death, high rates of morbidity, independence losses, or reductions in life quality. This form of unintentional injury has thus been the target of a voluminous amount of research that has extended for many years alongside multiple public health endeavors and others to reduce its occurrence and/or severity. Yet, with the exception of a few regions where bone building treatments have been employed, the lifetime risk of incurring a hip fracture has not decreased sufficiently over the last few decades and high numbers of incident cases continue to prevail, despite a large body of knowledge and a variety of contemporary preventive and refined surgical approaches plus clear indications that those worse off, are older adults in poor health.

***Type 2 diabetes and well being***

In many respects and especially given its disabling impact on the sufferer incurred directly by a deficit in glucose control, the aging type 2 diabetes sufferer may go on to experience serious nerve, blood vessel, and organ related damage, including the eyes, kidneys, heart and other parts of the body such as bone. As well as impacting the need for persistent self-care, associated multiple adverse cognitive alterations may arise that hasten the adult's decreasing ability to function physically, safely, and independently. A disease often linked to an exaggerated risk falls and falls mediated injuries, as well as bone mass density abnormalities and fractures its remediation is often delayed until it is too late and even then is marred by ongoing deficient proprioception, vision impairments, hypoglycemia or hyperglycemia, frailty, signs of peripheral and central neuropathy [10, 13-15].

Additionally, obesity can accompany or induce osteoporotic bone features, as may possible entrenched sedentary behaviors, alcohol usage, and smoking In addition, although type 2 diabetes predictably proves to be a highly pertinent disabling determinant of poor health outcomes in general, as well as injurious falls, most treatment protocols focus on pharmacological, rather than other modalities such as exercise.

Due possibly to erroneous beliefs of the idea prevention is better than cure as this applies to aging care in general, and despite an array of possible type 2 diabetes pathways that might be reversible and not inevitable, very little progress in the preventive realm to counter type 2 diabetes linked hip fracture occurrences has been forthcoming, and with no cure in sight, and remediation that is often suboptimal at best, many older adults continue to suffer a possible excess health cost and premature mortality at rates unchanged over literally decades [16-18]. In addition, it is increasingly apparent the presence of a type 2 diabetic condition is often underestimated in its own right until it is severe rather than not, and especially as a highly probable hip fracture risk factor. Its role as a fracture determinant in particular, especially its falls related underpinnings are thus often undiagnosed, or ignored. The same lack of due attention may prevail in the case of the older type 2 adult suffering from obesity and who may have osteoporosis, as well the frail type 2 diabetes adult case who may be more likely to experience worse outcomes if they fall on the hip when compared to disease free similar age adults as well as premature mortality, including all-cause mortality rate increases [16-19].

Additional research reveals that older people with type 2 diabetes especially those with measureable muscle strength declines, postural dyscontrol, and functional impairments [5, 7, 18] are likely to have up to a 2.5 fold increased risk of incurring a future injury, as well as having a higher fracture, impaired mobility and health-related functional risk [15, 20-22], plus ensuing bone related changes, such as accelerated bone mass losses or actual bone mineral density increases, as well as muscle mass declines [23-27].

***Additional observations***

As an example of why this topic remains salient to unravel, is the finding that within the Asian population alone where both diabetes and hip fracture rates are rising even though health services are deemed of high quality and available, Koh et al. [11] found the risk of hip fracture was almost double among cases with a diabetes history compared to those without the disease. Although the specific diabetes type was not well described, this relationship remained however, even when controlled for by stratifying the data according to body mass index, and the relationship was deemed to be strong and dose-dependent based on baseline interviews, and the incidence of hip fractures post-enrollment over a 12 year study period of 63, 257 Chinese adults.

Thus, even though Puar et al. [14] who produced counter intuitive data stating type 2 diabetes patients with tighter glycemic control are at greater risk of hip fracture, suggesting poor glycemic control is not associated with hip fracture, it seems safe to conclude, adults with either type 1 or type 2 diabetes, may experience a heightened risk for incurring a hip fracture over and above that due to age [15], as well as worse outcomes after hip fracture in the face of all its possible cumulative health correlates [16-30] and possible secondary hip fractures risk [31] in those with a history of hypoglycemia or neuropathy [32], as well as those who use insulin or certain anti diabetic drugs and/or display muscle strength declines [33, 34], and possible bone losses [10].

A forceful argument for more action here is hence warranted, not only in light of the burgeoning costs of care, and reduced life expectancy of survivors, but the argument put forth recently by Lu et al. [5] where they state the presence of a hip fracture is the most dangerous and potentially lethal fracture, and is possibly "the last fracture of life" clearly does not favor a life of quality and satisfaction. In this regard, a hip fracture is not only a complex multi dimensional injury in its own right, but one magnified in adults with type 2 diabetes where there may be excessive immune-inflammatory responses as well as nutrient deficiencies and bone losses that may lead to fragility fractures associated with elevated mortality and morbidity and in increasing, rather than decreasing rates [34, 37, 41]. Yet, the role of type 2 diabetes as a predictor of hip fracture risk and outcome severity has clearly been and continues to be overlooked quite regularly, especially given its impact on possible micro vascular complications and the disadvantage of prolonged strict glucose control [35]. A role for intramuscular fat or lipids on trabecular bone health has also been put forth [36].

Although a role for hip fracture or falls prevention for type 2 diabetes cases is not well studied [37], the data do suggest many older adults could benefit here, and thus not have to rely on possible harmful methods to lower blood glucose level [35, 46] that can impact bone as well as cognitions, falls risk, gait or vascular disturbances [23].

However, the vastly differing samples or populations, research designs, questions, and themes presently studied are either not sufficiently robust [8] or consistently supported [38] to drive practice. It is also likely hip fractures in this group may be unrelated to bone status in all cases [39, 40], and more likely/actually related to physical function attributes, or vision impairments [42-44]. Other falls mediating factors may be linked to possible high rates of co-occurring health conditions [37], polypharmacology, and undetected or unrecognized vascular complications [23, 45].

A role for neuropathic causes in increasing fracture risk among type 2 diabetes sufferers, especially among older women cannot be ruled out [51], for example, neuropathic foot ulcers and myopathies of the lower leg muscles that may arise in the diabetic over time may impair postural control and stability when walking and thus a decreased safety threshold if an obstacle is encountered.

There are however many other persistent indications that a type 2 diabetes diagnosis among high age adults with poor glucose control is determined by multiple interacting factors [16, 47] and that that those with a diabetes diagnosis are worse off at all stages of recovery if they do fracture a hip [6]. These diabetes cases may have to stay in hospital for longer periods than desired or the norm, and experience longer surgeries than those with no health condition. Insulin users are also more likely to be readmitted more regularly post hip fracture hospital discharge [48] as well as incurring high premature mortality rates, and hospital costs due to the frequent need for hospital readmissions, as well as basic care costs [49, 50].

Those with deficient bone quality profiles or subnormal body weights and a changing ratio of muscle mass to visceral fat [52] may be at high risk as well. The added impact of possible foot deformities and painful diabetic foot ulcers and their possible impact on fostering one or more gait impairments plus a high recurrent falls risk may continue to be problematic as well [53-55]. Compounding this series of adverse events may be a parallel declining disease induced ability to enact rapid favorable reflexive shock absorbing neural responses on demand in any falls related situation.

Associated type 2 diabetes linked declines in walking speed, balance, postural control, poor bone health, and impaired insulin signaling coupled with muscle mitochondrial dysfunction and atrophy, tendon tissue disruptions, and microvascular complications may additively foster disorganized weight bearing stress transmission and an associated limiting load-bearing bone capacity and an increase risk of a disabling hip fracture [2, 21, 56-58].

There are thus clearly many related factors, as artificially categorized in Table 1 that may converge to heighten an injurious falls risk in an older vulnerable adult, including mechanical factors that favor a sideways fall and hip impact, that could stem from a combination of an external as well as an internal source that damages hip bone integrity on impact if it is excessive. It appears however, that this cycle of possible events can be obviated or mitigated quite markedly by the elimination of five or more of the factors outlined in Table 1 [4, 39].

Indeed, it appears muscular determinants such as strength losses that can impact falls risks if assessed accurately and treated accordingly will have far reaching favorable implications for the diabetic hip fracture patient, including a possible lower risk of complications, and extended hospital stays and resource needs [4], plus the risk of a secondary hip fracture [61].

Examining the possible untested role of education, health literacy, health beliefs and behaviors, stress, sleep deficits, polypharmacology, and access issues may further advance the realm of actionable achievable preventive possibilities cited in Table 1.

| | |
|---|---|
| **BONE** | Decreased toughness/bone quality<br>Bone stiffness increases<br>Altered bone geometry [10, 15, 19, 25, 28] |
| **COGNITIVE FACTORS** | Anxiety/fears of falling<br>Confusion, dizziness<br>Impaired risk related cognitions<br>Vision problems |
| **MUSCLE BASED FACTORS** | Altered gait patterns/obstacle clearance<br>Balance disturbances<br>Strength and ankle proprioception<br>Impaired postural control [31\<br>Low physical activity levels [44]<br>Low walking distance [68]<br>Muscle fat ratio is altered [26, 28, 36, 52]<br>Peripheral neuropathy/pain [21]<br>Reduced vibration perception<br>Slow walking speed [63, 64, 66] |
| **OTHER** | Foot disease /lesions [33]<br>Medications that increase falls risk/type 2 diabetes Obesity [30]<br>Sleep disturbances<br>Vascular complications [23, 57]<br>Vitamin D deficiency [77]<br>Insulin need<br>Severe hypoglycemia [13, 14, 61] |

**Table 1**. Array of potentially modifiable factors believed to influence hip fracture risk among diabetics directly or indirectly through increasing falls risk

## Discussion

As outlined above, type 2 diabetes, a chronic health condition, and one increasing rapidly among the older populations, a group also at high risk for hip fractures, is a major health concern and one where vulnerable older adults may not be receiving optimal protective care or are encountering a worsening of their situation. This is hard to fully comprehend given at least 80 years of related study, but one that has yielded little in the way of advancing outcome expectations or improvements, despite a plethora of documented or envisioned possible preventive options to offset their combined dire public health and personal implications. Because these intertwined problems seem pervasive, we elected to examine in conjunction with our previous work what could explain this lack of progress in curtailing the spread of type 2 diabetes, as well as age related falls risk and hip fracture injuries from the viewpoint largely of the individual, rather than the environment. Our experience with actual patient populations in this respect even in the most advanced settings has led us to explore what limits the desire for more favorable outcomes and whether more can be done, and if so, in what regard.

In addition, we believe quite forcefully that improvements in this realm of any degree would have immense current as well as future public health ramifications and may help to dimish untold human costs while demarcating more accurately who is at most risk and what may prove most efficacious in reducing this projected dual burden. We elected to examine the key intrinsic risk factors for incurring a hip fracture in the presence of type 2 diabetes, rather than age or gender alone, plus the degree to which any additionally enumerated deterministic factors s are likely to be strongly indicated preventable, remediable, or reversible targets.

From our very extensive search we affirm that what emerges here, which is basically an unchanging landscape, is indeed one where despite a great need to reduce the older adult's falls risk and an immense hip fracture burden and great deal of suffering very few non medcal preventive efforts here have been forthcoming. That is, multiple data analyses point to minimal reductions in hip fracture occurrences and severity over time, and especially premature mortality rates, and that the outcome here is less desirable in the presence of type 2 diabetes in general [11, 68, 81, 82].

Moreover, there is no consensus here about what might be done, and no unique mode of prevention or intervention that appears to prevail to date. However, it is increasingly apparent efforts to advance muscle optimization regardless of method seems of high promise given the immense verifiable role of muscles in mediating the degree of total body mass and composition found to have independent relationship with hip ftacture risk among the elderly faller [28, 33, 35, 67-69].

This is an interesting actionable clinically salient vantage point in our view as outlined by Farmer et al. [67] who many years ago found the risk of hip fracture was negatively associated with a low arm muscle area, suggesting the likelihood of a slower normal reflexive protection mechanism, such as forearm extension to break a fall, thereby reducing the effectiveness of inherent protective strategies against bone fractures in the face of a fall that could be directed to the hip inadvertently in the already balance compromised type 2 diabetes sufferer. Similarly, the effectiveness of protective responses which may depend to some degree on arm as well as hip strength, and declines with age, may heighten the risk of fracturing a hip as a result of an impactful fall, especially in the type 2 diabetes case with low bone mass.

***Possible countermeasures***

To counter these aforementioned unwanted health events, possible key strategies include those below are promising, though not formulaic, and must be selected carefully and based on sound assessments and mutual understandings between the adult and the provider, as well as on identifying treatment targets, dosages, and frequency of application. Efforts that are tailored, and adjusted accordingly so as to empower the individual patient towards active self-directed health care, rather than passively based care are especially strongly advocated and may include:

α. Cognitive behavioral therapy

β. Falls prevention interventions/actions

χ. Foot care/footwear investments

δ. Maintaining a healthy weight

ε. Medication monitoring

ϕ. Nutritional education

γ. Optimizing chronic disease/vascular health states

η. Optimal glycemic control

ι. Physical activity participation

φ. Sleep health promotion

κ. Smoking cessation

λ. Strength/ balance training

μ. Vision deficit screenings

ν. Vitamin D screenings [77]

In addition, reliable health support, more routine assessments in the case of any possible susceptibility of an older adult to type 2 diabetes, as well as elders with a falls history, appears essential, including detailed physical and mental health exams, plus body mass indicators, muscle strength, gait, nutrition intake and access, vitamin D sufficiency estimates, and health beliefs and behaviors.

Clearly, since a hip fracture injury is a potent disabler in survivors, and induces untold personal and social costs, even after state of the art surgery, preventive treatments rather than reactionary interventions are especially indicated here and should be both timely and continuous, rather than sporadically applied [81, 82]. As well, even if screening newly diagnosed diabetic cases for their hip fracture risk would be helpful in the long run, more efforts to agree upon the most optimal tools and guidelines on assessment protocols are indicated. Based on such assessments, preventive approaches to specifically counter type 2 diabetes linked falls risks such Tai Chi exercises, careful counseling and neuromuscular stimulation applications to address adverse blood glucose impacts [85] may help to lower the overall high rates of hip fracture occurrences that may inadvertently foster more - rather than less - efficient glucose control alongside a need for heightened diabetes medication usage.

Also indicated are efforts to avoid disease associated bone attrition impacts, including the development of a possible abnormal spatial distribution of the trabecular bone, as well as declining bone resilience and possible erosion of focal areas of endocortical bone [23], are efforts to prevent any undue imbalance between bone cell osteoblast and osteoclast activity, coupled with microvascular dysfunction and metabolic acidosis that may reduce bone formation and induce a state of bone fragility. This may ensue more readily in the untreated diabetic case with muscle atrophy and a high degree of fat mass replacement than those who are treated accordingly, however [56].

***Additional insights***

To be successful at reducing the type 2 diabetic hip fracture burden the possible role of confusion or dizziness feelings, hypotension, as well as deficits in reflex response times and dynamic balance consequent to over or under usage of certain medications must be acknowledged and sought out [84]. Those high age adults exhibiting limited physical endurance, gait impairments, neuropathic foot ulcers, and muscle structural and functional reductions, and who may be at high risk for an injurious falls incident should be specifically targeted as well. Moreover, overweight individuals who would be expected to have a relatively higher proportion of body fat than average to dissipate a fall should receive counseling, even if their bone mass is within normal limits.

In addition to careful long term primary care efforts that may reduce the need for targeted peri operative management, and close post-discharge monitoring and follow-ups [48], persistent efforts to protect the musculoskeletal system as well as optimizing glycemic control may help reduce early post hip fracture surgery readmissions, while improving the short-term clinical outcomes and outlook for many cases despite an associated type 2 diabetes presence, particularly in those treated with insulin [21, 24, 52, 57] or those that present with high degrees of insulin resistance [61] and/or sarcopenic diabetes [83] and weak knee extensor muscles [62-66, 90].

In the interim, the provider may want to review the simplified conceptual framework outlined in Figure 1 as a starting point.

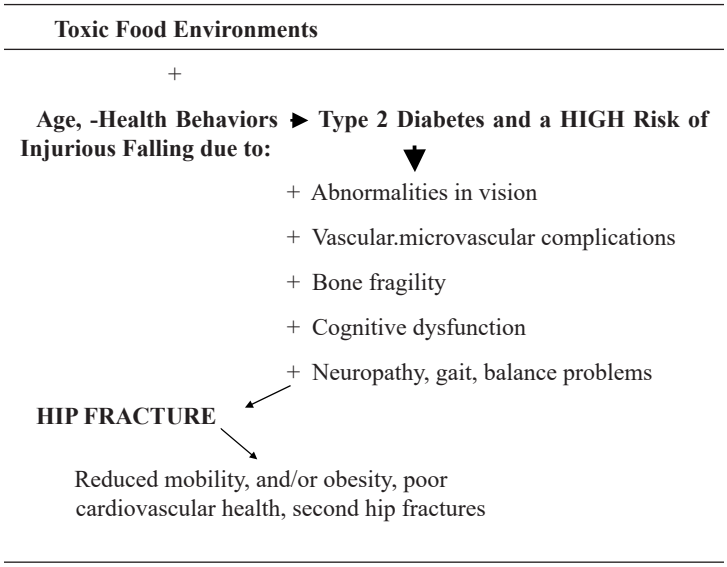



**Figure 1:** Hypothetical pathway implicating the likely impact of type 2 diabetes in hip fracture risk, reoccurence, life long disablity, and poor health outcomes in the high risk older adult subject.

## Summary

Although numerous possible pathways to incurring a disabling hip fracture in the face of a type 2 diabetes diagnosis appear to prevail, Farmer et al. [67] were among the first to stress the importance of exercising frequently so as to afford more muscle as well as bone protection to counter falls near the hip, regardless of blood glucose status. In addition, they pointed out that muscle when exercised can delay bone resorption processes in post menopausal women, and thereby their heightened vulnerability to subsequent hip fractures [70]. Cognitions, fears of falling, sleep and heart health situations are also likely to be favorably impacted as well, thus should be encouraged.

Another related view is that a precision exercise medicine framework integrating multi-omics phenotyping (genomics, metabolomics, and microbiome profiling) with data-driven clinical decision-support tools will prove highly beneficial [86]. This approach aims to translate mechanistic insights into individualized therapeutic strategies for the long-term management of type 2 diabetes and may be magnified in our view by attention to the presence of diabetes associated pain, impaired joint motion, sensory changes or reduced muscle strength around the affected lower-extremity joints, arrhythmias, postural hyper/hypotension, arterial stiffness-a correlate of peripheral neuropathy- and poor vision, gait problems, and bone composition alterations - all markers of possible demise warranting persistent oversight and expanded public health attention to avert the onset of hip osteoarthritis, post surgical gait asymmetries, excess inflammation and pain, and opioid use [70-75, 86, 87]. Examining the role of the health care system and food insecurity where this can be improved in this context may also prove revealing as well as efficacious, as may more precise estimations of the degree of specialized care needed by some, especially in cases with excessively high poorly controlled glucose levels and bone fragility [70, 72, 89].

Encouraging safe day to day activities and consistent self-care as well as follow-up care of any reparative proximal femoral fracture situation is especially recommended for those exhibiting one or more traits outlined below:

- Adverse neurological status
- Alcohol problems
- Arterial stiffness
- Bone fragility
- Defective gait/balance
- Dizziness
- Emotional distress
- Fears of falling
- Lack of activity opportunities
- Mental health deficits/confusion
- Muscle weakness/atrophy/sarcopenia
- Polypharmacology usage
- Poor nutrition
- Prior falls history

**Concluding remarks**

Despite the limitations of this report, we feel confident in concluding aging adults with type 2 diabetes may be at high risk for a single hip fracture or secondary hip fractures. In particular, it appears the decline in muscle function and balance as well as gait that arise with aging will likely be exaggerated in the presence of uncontrolled diabetes and as such appears to raise the risk of - as well as the impact of- any unwanted injurious falls event.

We further conclude that since the parameters that may play the largest role in this demise are likely a combination of muscle strength declines, muscle composition alterations, poor muscle coordination and endurance, it appears hip fracture risk and severity can be duly reduced by dedicated exercise training efforts [52, 71] even in the face of a poor glucose control ability.

In the interim, to combat their rising incidence, hip fracture researchers can:

1. Possibly reveal which factors related to type 2 diabetes are of specific import.
2. Follow or test the hypothesis put forth almost 40 years ago by Cummings [76] to amply explain why the type 2 diabetes older adult may be a great risk for falls related hip fractures and enumerate and classify the significance of. (a) a fall oriented towards an impact on or near the hip; (b) the failure of inherent protective reflex responses; (c) poor local soft tissues shock absorbing status, and (d) the degree of residual energy of the fall applied to the proximal femoral bone that must exceed its strength.
3. Researchers can examine the degree of support for a combination of measurements of neuromuscular function and of bone strength in the clinical realm as routine preventive as well as treatment practices, especially in type 2 diabetes contexts.
4. Researchers can be encouraged to examine the role of the knee extensors in the type2 diabetes falls and hip fracture risk cycle [90].

Until then, modifiable deterministic factors and others should be minimized accordingly and pro actively and the role played by factors other than blood glucose levels such as vitamin D levels and hypnotics [77, 78], related sarcopenic obesity, sensory impairments, polypharmacology, sedentary behaviors, or architectural barriers, among other factors such as patient empowerment [88] should not escape attention.

In particular, empowering the individual to be their own health manager by simply encouraging engagement in lifelong regular physical exercise, and stressing the importance of maintaining adequate nutrition so as to acquire and maintain an efficient muscle mass that declines as little as possible during the aging process should be examined to ascertain if this alone can help optimize peak bone mass and other hip joint protective correlates to a high degree or alternately can compress the time frame for manifesting related disabling aging manifestations.

These insights are not ours alone or negate a role for improved public health oversights, , but as recounted in early work, type 2 diabetes remains a potentially potent hip fracture underrepresented and discussed determinant in both older women and men, and in both obese as well as normal weight and obese cases that warrants considerable more immediate rather than delayed attention [74], especially in those cases with neuropathic pain or vascular impairments, poor balance and gait, and/or heightened feelings of stress and anxiety and persistent hypo or hyperglycemia [79, 80].

By contrast, we strongly conclude that in the absence of more insightful, concerted and timely efforts in this regard, the status quo may become the norm for years to come.

**Final word**

Because of the human and fiscal costs involved, it appears essential for physical therapists and others, to carefully examine what is needed for offsetting a life of possible relentless suffering and diminishing function in older adults with poorly controlled type 2 diabetes where this condition cannot be prevented readily. Specialized, timely, long term, insightful, personalized, activity oriented approaches rather than generic or passive approaches are increasingly indicated here in our view and should be duly encouraged.

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