

# The Significant Link Between Diabetes and Falls: How A Personal Emergency Response System (PERS) Can Help Ameliorate the Risk

By **Jennifer G. Maybin**

Most research studies of falls in the United States are conducted in individuals who are 65 years and older. Older age is an obvious risk factor for falls because older individuals tend to have several comorbidities, are incrementally becoming weaker and frailer, may have difficulty with balance and walking, and often live alone. The costs for nonfatal falls in this age group are about \$50 billion per year in both direct and indirect expenses.<sup>1</sup>

Many health care providers, caregivers, families, and patients are less aware of the increased risk of falls among patients who have certain chronic disorders. One comorbidity that can increase the risk of falls in all age groups is diabetes, and the complications from such falls are often greater in this group than in those without diabetes.<sup>2</sup> Of greater concern is that patients with diabetes experience more-severe problems after falling than those without diabetes, including worse mobility after the fall.<sup>3</sup> Fractures and poorer rehabilitation results make falls more treacherous for people with diabetes.<sup>4</sup>

Of the \$50 billion per year in direct and indirect costs related to falls across all age groups, the cost of falls among those with diabetes is \$10 billion per year.<sup>1,5</sup> And people with diabetes who have fallen once are 50% more likely to become chronic fallers (falling two or more times within a 1-year period). And, with more frequently falling comes an increased risk of injury.<sup>5</sup>

## Fall Risks Associated with Diabetes

In patients with diabetes, sensorimotor function decreases, musculoskeletal/neuromuscular deficits worsen, foot and body pain emerge, and pharmacological complications arise from multiple medications.<sup>4</sup> Patients with balance and peripheral neuropathy often have an intense fear of falling, which, in turn, leads them to limit activities.<sup>3</sup>

---

*Jennifer G. Maybin is the Executive Editor of CareManagement.*

### **Glucose Control**

Patients with diabetes who take insulin and have an HbA1c level below 7% (tight glucose control) are 4 times more likely to fall than those whose levels are above 7%. The lower HbA1c level increases the risk of hypoglycemia, which can cause blurred vision, dizziness, and weakness. Oral diabetes drugs are less likely to increase the risk of falling, except for metformin, which can lead to vitamin B12 deficiency and balance problems.<sup>2</sup>

### **Peripheral Neuropathy**

Moreover, patients with diabetes are at risk for peripheral neuropathy, which lessens sensation and causes numbness and pain in the legs and feet. About 25% of people with diabetes develop peripheral neuropathy.<sup>5</sup> Loss of sensation and numbness can, in turn, increase the risk of a fall. Studies have shown that people with diminished plantar feeling in the feet lose postural control and begin to sway when standing and walking. These deficits can increase the risk of falls when a person is standing and reaching for an object.<sup>4</sup>

About half of all patients with diabetes have some degree of nerve damage. This nerve damage is often worse in the feet and ankles, making walking on uneven surfaces or around objects more difficult. Those who have neuropathy have poor balance, and with poor balance comes functional disabilities, all of which accumulate to increase risk of falls.<sup>2,4,7</sup>

### **Musculoskeletal/Neuromuscular Deficits**

Decreased activity, often occurring in older adults, lessens muscle strength. It's been shown that lower plantar flexion strength correlates with decreased balance and stability and a compromised walking gait.<sup>4</sup>

### **Diabetic Retinopathy**

Diabetic retinopathy can make it difficult for people with diabetes to see well; this condition is also linked to falls.<sup>3</sup> People with diabetes also have a greater risk of cataracts and glaucoma, which can lead to poor vision. About half

## Complications from falls are often greater in patients with diabetes than in those without diabetes.

of older adults with severely impaired vision said they had fallen in the last year compared with about one-quarter of older adults with good vision.<sup>7</sup>

### **Polypharmacy**

The number of medications a patient takes also increases the risk of falls by 7% for each additional medication. Many patients with diabetes also have heart and blood pressure problems, and the medications that lower blood pressure and treat heart disease increase the risk of falls. Others break hips or other bones that can produce chronic pain and reduce their ability to get around.<sup>1,7</sup>

Patients with diabetes face a cascade of problems that can limit quality of life, increase the risk of injury from falls, and increase the risk of mortality at a younger age. Heart disease can cause lightheadedness without warning.<sup>7</sup> Add these risks to those of hypoglycemia, and the risk of falls increases exponentially.

### **Obesity**

Obesity is another risk factor for falls. One study found that patients with diabetes who also had a body mass index (BMI) of 35 or more were significantly more likely to have a fall than those with lower BMIs.<sup>7</sup>

### **Fear and Social Isolation**

The fear of falling among patients with diabetes may also cause these patients to restrict activities, leading to muscle weakness, loss of balance and coordination, and lack of socializing. Individuals with diabetes who live alone increase their risk of falls just by being socially isolated.<sup>5</sup>

## The Cost of Falls

According to the Centers for Disease Control and Prevention (CDC), 1 in 5 falls results in serious injury such as traumatic brain injuries or broken bones. Each year, about 2.5 million older adults present at the emergency department with traumatic brain injuries resulting from falls. Others break hips or other bones that can produce chronic pain and reduce their ability to get around.<sup>1,7</sup>

The American Diabetes Association reports that about 22%-33% of people over age 60 have diabetes, and researchers project that the number of cases of diabetes

over the next 4 years will increase more than fourfold.<sup>8</sup> Add to that the aging trend in the United States as the baby boomers reach retirement age, and the scene is set for costly falls and injuries that may decrease quality of life, mobility, and life expectancy among older patients with diabetes.

## Options for Reducing Fall Risk

What can patients with diabetes do to help reduce their risk of falls? Among those with diabetes, staying safe and active are paramount.<sup>8</sup> Physical and occupational therapy as well as gait training may help some patients. On their own, however, patients can exercise, wear well-fitting nonslip footwear (and possibly even therapeutic footwear if loss of sensation or neuropathy in the feet makes walking difficult), practice balancing and strength exercises, and stay mobile. Studies have shown that exercise reduces the risk of falls or prevents serious injury when a fall occurs.<sup>3</sup> Other suggestions to reduce the risk of falls are to:<sup>2-4</sup>

- Remove throw rugs and obstacles on the floor
- Install handrails
- Maintain good lighting
- Use night lights throughout the home
- Position the bed lower to the floor
- Trim outside shrubbery around walkways
- Make sure that electric cords are not lying in a well-used pathway
- Avoid wearing just socks on floors that are not carpeted
- Use a personal emergency response system (PERS) with automatic alerts

## Using a PERS

A PERS enables automatic reporting (auto alerts) of falls to a medical call center and, thereby, allows for quicker response from medical personnel or family members and friends. This system could be helpful for patients with diabetes.

### **Benefits of Automatic Fall Detection and Reporting**

There are several types of personal emergency response systems. Some systems allow the user to report a fall to a help center, if the user so chooses and is able to do so.

Other systems offer automatic fall detection. An automatic fall detection can initiate an emergency response as quickly as 21 seconds. Comparatively, if an older adult calls for emergency medical services, the average time span before help arrives is 2 hours. If a family member calls, the wait can be 9 hours. And if a landlord calls, it can be as long as 72 hours.<sup>9</sup> This delay leads to greater morbidity, longer hospital stays, and possible loss of independence because of the consequences of the fall. The biggest benefit of automatic fall alerts is the quick response and transportation to emergency care. The quicker the care is provided, the better the outcomes. These systems may also help avoid unnecessary hospital care. These automatic systems also help prevent suffering if a person with diabetes is left lying on the floor, unable to move for prolonged periods (Figure 1).<sup>9,10</sup> Some falls will not require emergency care or hospital care, but they will demonstrate that the patient is at risk of falling and make patients with diabetes and others aware of the need for more fall prevention measures and support.

The automatic reporting feature can also prevent older adults from hiding falls from family members and care-

givers, which some individuals who don't want to lose their independence are apt to do.<sup>11</sup> Keeping an accurate record of falls can be difficult because many older adults choose not to tell their clinicians and caregivers, perhaps fearing loss of independence. In fact, fear of loss of independence is the number 1 fear among older adults, far greater than the fear of death.<sup>11</sup> However, knowing about falls can help clinicians and caregivers help older adults reduce their falls and increase their chances of remaining independent.

The immediate notification provided by a PERS with automatic fall detection gives caregivers and medical professionals a fuller picture of what caused the fall. Caregivers and occupational therapists, for instance, can take proactive steps to make the older adult's home safer—perhaps by adding guardrails in bathrooms and kitchens or changing a bed to one that is easier to get into and out of. By having a record of falls, case managers can also better assess the health status of a patient with diabetes. Perhaps medication changes are needed or maybe physical therapy should be initiated to improve balance and coordination.

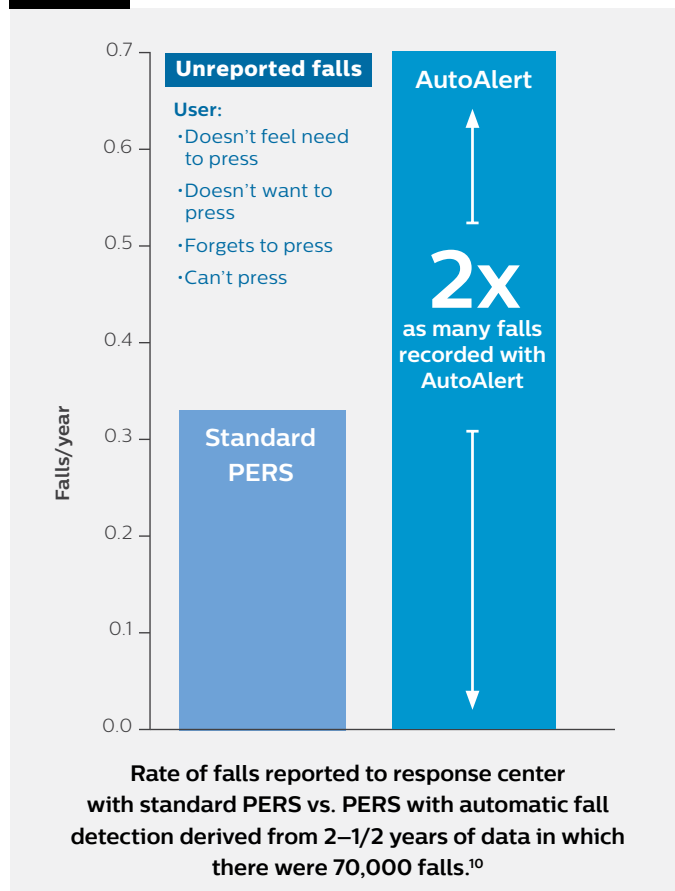
Recently, one PERS manufacturer expanded its auto alert PERS to include a digital application called Philips Cares. Caregivers and patients can form care circles, receive notification updates, set their status, and more.

Numerous fall prevention strategies are available to help older adults maintain independence and prevent falls. These include exercise and physical activity, balance and gait training, environmental and behavioral interventions, and medication management.<sup>12</sup> But first, clinicians and caregivers must be aware of the risk and occurrence of falls for their patients and loved ones. More reporting of falls can lead to better outcomes, including faster transport to hospitals, shorter hospital stays, and timely emergency response. Equipping a person with diabetes with a PERS can also help them feel less afraid of falling, make them more willing to participate in activities they enjoy, and enable them to exercise.

## Selection of PERS

Numerous companies provide PERS. A wise consumer or case manager should investigate the systems to find out which ones offer automatic alerts and other needed features. Some older adults may assume that their smart phones, Alexa, or Google Home will be sufficient. But a smart phone may not be handy, and neither Alexa nor Google Home can currently call 911, which is what PERS does.<sup>13, 14</sup> Because GPS is not always reliable, some companies also offer premium locating technologies beyond just GPS ([up to 6 different locating technologies](#)).

**FIGURE 1**



**Patients with diabetes face a cascade of problems that can limit quality of life, increase risks of injury from falls, and increase the risk of mortality at a younger age.**

## Case Managers and PERS

Case managers should learn about the different types of PERS so that they can better advise patients or advocate on their behalf. The benefit of having automatic fall detection has been outlined here. What else should be considered? A manufacturer who offers a 24/7 call center and well-trained customer service representatives is also extremely important. Falls often happen at night when people get into and out of bed. Without 24-hour service and automatic fall detection, a middle-of-the-night fall is not registered and emergency response cannot be called unless the individual is able to call 9-1-1.

Other concerns that case managers and their patients may have are:

- Costs of activation and monthly fees
- Cancellation fees
- Access to cellular service
- Certification of monitoring centers by Underwriters Laboratories or the Department of Defense
- Battery life (several days vs a few hours)
- Nonemergency customer service hours
- The number and types of location technologies

Some systems are home-based systems that include a wearable call button, allowing the user to speak to a dispatcher through a base unit in the home. These systems work only in the home. Mobile systems allow users to be protected when they are out and about by incorporating GPS technology and cellular networks.

As case managers, you always put the patient's health first. Case managers can help reduce chronic falling among the growing population of older adults with diabetes by alerting caregivers and clinicians about modifications in patients' medications and environment, by treating complications of diabetes, and by ensuring that patients with diabetes have the equipment that can decrease long-term morbidities and even mortality. In addition, case managers should be able to educate patients with diabetes and their caregivers and clinicians about the use, characteristics, and pricing of personal emergency response systems.

## References

1. Centers for Disease Control and Prevention (CDC). Falls data. Cost of older adult falls. <https://www.cdc.gov/homeandrecreationalsafety/falls/fallcost.html>. Last reviewed September 17, 2019. Accessed November 25, 2019.
2. Piven Haltiwanger E. Preventing falls. *Diabetes Self-Management* [online]. <https://www.diabetesselfmanagement.com/managing-diabetes/general-health-issues/preventing-falls/>. Published June 28, 2013. Accessed November 25, 2019.
3. Bruce D, Hunter M, Peters K, Davis T, Davis W. Fear of falling is common in patients with type 2 diabetes and is associated with increased risk of falls. *Age Ageing*. 2015;44:(4)687-690.
4. Crews RT, Yalla SV, Fleischer AE, Wu SC. A growing trouble triad: diabetes, aging, and falls. *J Aging Res*. 2013;2013:342650.
5. Connor-Kerr T, Templeton MS. Chronic fall risk among aged individuals with type 2 diabetes. *Ostomy Wound Manage*. 2002;48(3):28-34, 35.
7. Gower T. Why diabetes raises your risk of falling. Healthcentral website. <https://www.healthcentral.com/article/diabetes-can-raise-risk-of-falling>. Published January 26, 2017. Accessed November 26, 2019.
8. Kirkman MS, Briscoe VJ, Clark N, et al. Diabetes in older adults. *Diabetes Care*. 2012;35(12):2650-2664.
9. Data on file. Philips Lifeline. 2015.
10. Philips qualitative research study of AutoAlert users, January 2014.
11. Home Sweet Home Care. Loss of independence and falling: the unpleasant connection. <http://www.homesweethomecareinc.com/caregiver-helpers/reduce-falls-remain-independent/>. Published August 13, 2015. Accessed June 3, 2019.
12. Berg RL, Cassells JS, eds. *The Second Fifty Years: Promoting Health and Preventing Disability*. Washington, DC: National Academies Press; 1992.
13. Roberts C. How to choose a medical alert system. Consumer Reports website. <https://www.consumerreports.org/medical-alert-systems/how-to-choose-a-medical-alert-system/>. Published February 7, 2019. Accessed June 3, 2019.
14. Krause S. Alexa can do many things but won't call 911. *The Wall Street Journal*. November 6, 2018. <https://www.wsj.com/articles/alexa-can-do-many-things-but-wont-call-911-1541500202>. Accessed December 10, 2019.

## CEU exam

Take this exam online >

Take the test online and then immediately print your certificate after successfully completing the test. Or print, complete, and mail the exam on the next page.

Exam expires March 15, 2021

This exam is FREE to all.

[Click here to join ACCM](#) and get access to more CEs—up to 24 per year!

## Questions

- 1. What is the annual cost of falls among patients with diabetes?**
  - a. \$6 billion
  - b. \$8 billion
  - c. \$10 billion
  - d. \$12 billion
- 2. Compared with patients without diabetes, how likely are patients with diabetes who have fallen once to become chronic fallers?**
  - a. 20% more likely
  - b. 30% more likely
  - c. 40% more likely
  - d. 50% more likely
- 3. In patients with diabetes, which of the following increases the risk of falls?**
  - a. Musculoskeletal/neuromuscular deficits
  - b. Foot and body pain
  - c. Pharmacological complications
  - d. All of the above
- 4. A lower HbA1c level increases the risk of falls because of which of the following?**
  - a. Dizziness
  - b. Blurred vision
  - c. Weakness
  - d. All of the above
- 5. People who have neuropathy have poor balance that leads to functional disabilities that accumulate to increase the risk of falls.**
  - a. True
  - b. False
- 6. According to the Centers for Disease Control and Prevention, what percentage of falls results in serious injury such as traumatic brain injuries or broken bones?**
  - a. 5%
  - b. 10%
  - c. 15%
  - d. 20%
- 7. Some options for reducing the risk of falls include:**
  - a. Remove throw rugs and obstacles on the floor
  - b. Maintain good lighting
  - c. Use a personal emergency response system with automatic alerts
  - d. All of the above
- 8. Benefits of a personal emergency response system include:**
  - a. Reporting a call to a call center
  - b. Initiating a timely emergency response
  - c. Preventing falls from being hidden from family members and caregivers
  - d. All of the above
- 9. More reporting of falls can lead to better outcomes including:**
  - a. Faster transport to a hospital
  - b. Shorter hospital stays
  - c. Timely emergency response
  - d. All of the above
- 10. Case managers can help reduce chronic falling among patients with diabetes by alerting patients, caregivers, and families of the risk of falls and by letting them know about ways to reduce these risks including the use of a personal emergency response system.**
  - a. True
  - b. False

Take this exam online >

Take the test online and then immediately print your certificate after successfully completing the test. Or print, complete, and mail this answer sheet. Exam expires March 15, 2021

## The Significant Link Between Diabetes and Falls: How a Personal Emergency Response System (PERS) Can Help Ameliorate the Risk

### Objectives

March 2020

1. State the economic impact of falls among patients with diabetes.
2. State five risk factors for falls among patients with diabetes.
3. State two benefits of automatic fall detection and reporting for patients with diabetes..

### Answers

Please indicate your answer by filling in in the letter:

1. \_\_\_\_ 2. \_\_\_\_ 3. \_\_\_\_ 4. \_\_\_\_ 5. \_\_\_\_ 6. \_\_\_\_ 7. \_\_\_\_ 8. \_\_\_\_ 9. \_\_\_\_ 10. \_\_\_\_

### Continuing Education Program Evaluation

Please indicate your rating by circling the appropriate number using a scale of 1 (low) to 5 (high).

- |  |   |   |   |   |   |
|--|---|---|---|---|---|
| 1. The objectives were met.  | 1 | 2 | 3 | 4 | 5 |
| 2. The article was clear and well organized.                       | 1 | 2 | 3 | 4 | 5 |
| 3. The topic was both relevant and interesting to me.              | 1 | 2 | 3 | 4 | 5 |
| 4. The amount and depth of the material were adequate.             | 1 | 2 | 3 | 4 | 5 |
| 5. The quality and amount of the graphics were effective.          | 1 | 2 | 3 | 4 | 5 |
| 6. I would recommend this article.                                 | 1 | 2 | 3 | 4 | 5 |
| 7. This has been an effective way to present continuing education. | 1 | 2 | 3 | 4 | 5 |
| 8. Additional comments:  |   |   |   |   |   |

#### Please print:

\*Certificant's Name: \_\_\_\_\_  
 \*Email Address: \_\_\_\_\_  
 \*Mailing Address: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

#### Please complete all that apply:

CCM ID# \_\_\_\_\_  
 CMSA ID# \_\_\_\_\_  
 CDMS ID# \_\_\_\_\_  
 RN ID# \_\_\_\_\_  
 ACCM Membership# \_\_\_\_\_  
 ACCM Exp. Date \_\_\_\_\_

\*CE exams cannot be processed without above information.

CE contact hours applied for:  CCM  RN  CDMS

This educational manuscript has been approved for 2 hours of CCM and CDMS education credit by The Commission for Case Manager Certification and the Certification of Disability Management Specialists Commission. Provider #00059431. It has also been approved for 2 contact hours of nursing credit by the California Board of Registered Nursing. To receive credit for this exam, you must score 80% or above. Exam expires November 1, 2020.

**PLEASE NOTE:** Exam may be taken online at [www.academyCCM.org/ce](http://www.academyCCM.org/ce) or by clicking the link found in this supplement. Take the exam and immediately print your certificate after successfully completing the test. Mailed exams should be sent to: **Academy of Certified Case Managers, 1574 Coburg Road #225, Eugene, Oregon 97401.** Please allow 4 to 6 weeks for processing of mailed exams.

This CE exam is protected by U.S. Copyright law. You are permitted to make one copy for the purpose of exam submission. Multiple copies are not permitted.

If you are not an ACCM member and wish to become one, please [click here](#).