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Injuries and Unattended Home Exits in Persons with Dementia: A 12-Month Prospective Study

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Abstract

Persons with dementia (PWD) are at particular risk for injuries and unattended home exits. The purposes of this study were to prospectively describe the characteristics and determine the hazard rates of unattended home exits and injuries. Nine times over 12 months, data were collected from 53 PWD's caregivers about PWD unattended home exits or injuries. Twenty-four percent of PWD had at least one unattended exit; four participants exited multiple times. Males and younger PWD were significantly more likely to exit than females or older individuals. Thirty percent of PWD sustained injuries in 29 separate incidents; all but three injuries were caused by falls, and 38% of injuries resulted in nursing home placement. The hazard rate of untoward events was high, at approximately 1 unattended exit and 1 fall per person-year. For all PWD living in the community, healthcare plans should include specific interventions to prevent these untoward events.

Keywords

dementia; falls; injuries; home exits; injuries

Introduction

Dementia is a syndrome caused by a number of acquired, progressive, life-limiting diseases that affect not only memory, but judgment, balance, wayfinding, and abstract thinking.^{1,2} These deficits lead directly to two different problems that impact both persons with dementia (PWD) and their caregivers: leaving the home in an unsafe manner (unattended home exits) and injuries. Unattended home exits can result in individuals becoming lost in the community and potential death from exposure to the elements, drowning, or being struck by a motor vehicle.³ PWD are also at high risk for sustaining injuries, particularly due to falls.

PWD may leave the home setting while the caregiver is engaged in an activity in a different part of the house, is asleep, or leaves the home, even for a few minutes.⁴ Once PWD leave, they may be unable to find their way home and become lost. While the majority of individuals are found safe and returned to their caregivers, some individuals die after becoming lost.³ The primary mechanism for preventing unattended exits is intensive supervision by the caregiver. However, the Alzheimer's Association reports that 60% of individuals will wander away from the caregiver at some point (evidence for the basis of this figure is somewhat unclear).⁵ In order to substantiate the need for interventions to assist caregivers, it is important to establish a hazard

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rate and understand the circumstances in which PWD leave the home unattended even when they have full-time relative caregivers.

In a retrospective study of PWD treated in emergency departments for injuries that occurred at home, most of these were from falls.⁶ Two other studies that prospectively examined falls in community-dwelling PWD also found high fall rates (42% over a 1-year period⁷ and 7.4% over a 2-week period⁸). Since falls can cause significant injuries such as hip fractures that are associated with high morbidity in subsequent years,^{9,10} it is crucial to understand more about the mechanisms of falls and circumstances surrounding falls. Additionally, it is important to determine prospectively whether there are other types of injuries that either commonly occur or are serious in nature. This information would be very useful in planning care needs for PWD and in supporting projects to design and test interventions to prevent these events.

In addition to direct consequences of unattended exits and falls on PWD, these two events require caregivers to provide intensive supervision in an effort to prevent their occurrence. Frequently, the responsibility for this rests solely on the caregiver, generally a single family member, and is associated with high levels of burden.¹¹ Thus interventions targeting unattended exits and falls may also have beneficial effects for caregivers.

The purposes of this study were to 1) describe the rates and types of injuries that occur in PWD living in the home, and 2) describe the rates and circumstances of unattended home exits in this population.

Methods

Design

The data analyzed herein were collected in an ongoing study designed to develop and test a night monitoring system that can be used by caregivers of PWD to prevent unsupervised nighttime activity.¹² Caregivers were randomly assigned to either receive the night monitoring system or to a control group that received monetary compensation. The night monitoring system was designed to alert caregivers when PWD arose during the night. It was not designed to reduce injuries or unattended exits during waking hours. At nine points in time over a 12-month period, data were collected from caregivers about any PWD injuries or home exits. For the purpose of these analyses, we will examine all incidents to describe the characteristics of injuries and unattended exits, but only data from the control group will be used to establish the hazard rates of these events.

Sample

Fifty-three participants were enrolled, with 26 assigned to the experimental group and 27 to the control group. Recruitment of participants was accomplished through newspaper and newsletter advertisements, through presentations about the study at caregiver conferences and support groups, and through day care centers and home health agencies. Inclusion/exclusion criteria included a medical diagnosis of Alzheimer's disease or other dementia as reported by the caregiver and a Mini-Mental Status Exam score in PWD of <23. In the sample, the predominant dementing illness was dementia of the Alzheimer's type (n=41, 77%), followed by vascular dementia (n=4, 8%), Lewy body dementia (n=2, 4%), and unknown or other (n=6, 11%). Self-identified race was reported as follows: 42 (79%) white non-Hispanic, nine (17%) African American, and two (4%) Hispanic. Gender of participants was approximately equal (52% male), and the average age was 79.6 (± 8.33) years.

Measures

Injuries—At each data collection point (months 1, 2, 3, 4, 5, 6, 8, 10, and 12), caregivers were asked to describe any injuries that occurred since the previous data collection point. The American National Standards system was used to code each reported injury, ranging from skin bruises/scrapes to fractures.¹³ Information was collected about the following: nature of injury (what was injured); source of injury (what caused the injury); accident type (what caused the event); the event(s) surrounding the injury; time and place of injury occurrence; and disposition (return home, temporary out-of-home placement in hospital or rehabilitation, or permanent out-of-home placement). Nighttime injuries were recorded as such if the caregiver was sleeping at the time of injury.

Unattended home exits—At the same nine data points, caregivers were asked about any unattended exits from the home. It was considered an *unattended exit* when the care recipient successfully crossed a doorway from the home alone, unknown to the caregiver. An exit was considered *nighttime* if the caregiver was asleep at the time it occurred. Details of the recorded exit included the following information: time of exit; antecedents of exit; caregiver's location during exit; duration of exit; any injuries related to exit, and disposition.

Procedure

The Institutional Review Board of a large university approved the initial study. All data were collected via interviews with caregivers in the home. Data were entered directly into a spreadsheet using a data coding interface to minimize data entry errors.

Statistical Analysis

Statistical Package for the Social Sciences (SPSS) 15.0 was used for data analysis, which involved univariate descriptive statistics and bivariate statistics (X^2 and t -tests). The significance level α was set at 0.05. All data were used to describe the events, but only data from the control group were used to set the hazard rates. Hazard rates were calculated as total number of control participants with an event divided by total number of study days for control participants. This was multiplied times 365 to get a rate in person-years. (Only control participants were used because the study intervention could have influenced rates of injuries and unattended home exits during the night.)

Results

Unattended Home Exits

During the study, 13 (25%) caregivers reported that the PWD had at least one exit. Of this 13, nine (69%) exited only one time and one person each exited two, three, four or five times. The total number of unattended exits reported was 23. Of these, 14 (61%) occurred during the day, seven (30%) occurred at night, and the time was not recorded in two (9%) instances. The hazard rate for experiencing at least one unattended home exit was 0.94 per person year [(13 events/5028 study days)*365]. Males (39%) were significantly more likely to exit than females (8%) ($X^2 = 6.98$, $p = 0.008$). The average age of participants who exited was 75 years, significantly younger than those who did not exit (81 years of age) (t -statistic = 2.10, $p = 0.04$). There was no significant association between whether there was a diagnosis of Alzheimer's disease versus non-Alzheimer's dementia and whether an unattended exit occurred ($X^2 = 1.57$, $p = \text{NS}$). Nor were any differences found in a comparison between whether an exit occurred and severity of behavioral symptoms of dementia (as measured by the Neuropsychiatric Inventory–Questionnaire) at study baseline ($t = 0.43$, $p = \text{NS}$).

PWD who exited were found both on and off their property, and data about where they were found was recorded for 21 cases. In 43% ($n = 9$) of these reports, the PWD was found on his or her own property. The 57% ($n = 12$) found off the property were all found in their own neighborhoods. Individuals found during the day were more likely to be found off property (73%), while those found at night were more likely to be found on the property (86%) ($X^2 = 9.78, p = 0.04$). One of these individuals had driven away, and his caregiver coached him home using his cell phone. Another PWD was found in a neighboring field entangled in barbed wire. Law enforcement agencies were called in 19% ($n = 4$) of the cases and were responsible for finding the PWD in three instances. In 14% of the reports, the caregiver had to call a family member or friend in order to locate the PWD ($n = 3$). One PWD was institutionalized due to multiple unattended home exits.

Two individuals sustained injuries while they were gone. One sustained scratches after getting caught in barbed wire fencing, and the other sustained lacerations on his legs from an unknown mechanism. In order to calculate an overall rate of untoward events, these incidents were considered unattended exits and not counted again in the injury analysis. In all cases but one, a caregiver was in the home at the time the PWD left unattended. Generally, the caregiver was distracted (e.g., engaged in a household activity), or the PWD was occupied in a normal activity but for some reason left the house or property unattended.

Injuries

There were 16 PWD (30%) who sustained injuries in 29 separate incidents. Nine participants had one incident, four had two incidents, and one participant each had three, four, or five incidents. The hazard rate for sustaining an injury was 1.16 per person year. There were 16 events occurring in a total of 5028 study days. Three participants had both an unattended exit and an injury event.

Four PWD (25%) sustained fractures. The remaining injuries involved the skin or joint sprains (see Table 1). All but three injuries were caused by falls; non-fall injuries were caused by striking an object, such as a piece of furniture. PWD most often sustained their injuries inside the home (66%). These occurred in a variety of locations, including the living room, dining room, bedrooms, and bathroom. Thirty-three percent of the injuries occurred outside the home, with 5% occurring off the participant's property. Seventeen incidents occurred during the day, seven at night, and the time is unknown in 5 incidents.

PWD gender did not significantly influence number of injuries sustained ($X^2 = .07, p = \text{NS}$), nor did age influence this (t -statistic = 0.18, $p = \text{NS}$). As with unattended exits, neither type of dementia ($X^2 = 0.43, p = \text{NS}$) or severity of behavioral problems ($t = 0.39, p = \text{NS}$) was related to whether an injury was sustained.

Injured PWD were most commonly found by their spouses, accounting for 46% ($n = 12$) of the incidences. Non-spousal relative caregivers found injured PWD 42% ($n = 11$) of the time. Paid daytime care providers found injured PWD 8% ($n = 2$) of the time.

Injuries led to four (25%) of the 16 participants' placement in a nursing home permanently, and two (13%) in a nursing home temporarily. Two individuals with permanent nursing home placement sustained only skin injuries. One PWD died five days after sustaining a deep laceration to his arm.

Discussion

Unattended home exits and injuries occurred in a significant proportion (24%, 30%, respectively) of PWD living in their homes within a one-year period. For those sustaining

events, the consequences were very high, with five of the 29 PWD (17%; 9% of total sample) being permanently placed in a nursing home as a direct result of the event. In addition, one participant died as a result of injuries sustained in a fall, and two others required temporary nursing home placements.

Hazard rates were also very high, indicating the likelihood of an injury or an unattended exit in a year's time, even if a full-time family caregiver is present. The need for constant supervision can be extremely draining for caregivers, so it is essential for care providers to ensure that all available supports, such as respite care or adult day services, are recommended to caregivers to aid them in this effort.

Strategies to prevent unattended home exits and falls also need to be recommended. Previous research supported that unattended home exits are unpredictable and all PWD are at risk.⁴ Currently, there is no specific technology to assist caregivers in identifying unattended home exits although at least one system is in development.¹² Caregivers need to reconfigure other technologies to help monitor the PWD. For instance, an intercom system commonly used to monitor infants sleeping in a separate room can be used. The major drawback to this solution is that PWD have to make enough noise when exiting or arising during the night to alert caregivers as this system contains no alarms. Another option is individual door alarms, but these, too, have their limitations. Placed on exit doors, they emit a sound when the door is opened, but often the sound is soft, which is less distressing to the PWD but cannot be heard by the caretaker unless he or she is nearby. The louder the sound, continuously emitted until reset, the more probable the agitation or anxiety produced in the PWD. All PWD should be registered in some type of program that will assist in a safe return if they become lost in the community. One example is the MedicAlert+SafeReturn program.

Healthcare providers should also recommend strategies for preventing injuries, which occur primarily from falls, in care plans for PWD. Limited previous research identified lower levels of ADL function,¹⁴ previous history of a fall,¹⁴ and neuroleptic drug use¹⁵ as predictors of falling; however, most individuals with dementia will eventually fall into these categories so these are not particularly helpful in identifying those at risk. This study indicated that neither age, gender nor exiting behavior was a predictive factor for injuries. Thus fall prevention strategies are critical, but research is currently lacking that identifies these for PWD and caretakers in the community setting.¹⁵ Until this gap is addressed, it may help to review PWD's medications and avoid those associated with greater fall risk, such as psychotropics, and to ensure there is regular physical activity to maintain strength and mobility.

With regard to the significant burden these two events place on caregivers and the healthcare system in terms of early institutional placement, it is reasonable to consider investment of resources at the community level. Respite services through formal care settings, such as adult day services, can provide a rest period for caregivers as well as an opportunity for PWD to engage in physical activity. Volunteer services from churches or service organizations can be employed to ensure PWD are not left unattended in the home or to provide caregivers with much needed breaks. Shifting healthcare dollars to cheaper community-based services may prevent early institutionalization, ultimately lowering healthcare costs.

In conclusion, using prospectively collected data at multiple points over a 1-year period, hazard rates and descriptions of characteristics of unattended exits and injuries were established. Future research is warranted to validate these findings, identify predictors, and identify evidence-based strategies to prevent these untoward events. Much injury research on PWD has been in the institutional setting in which different factors, such as restraints, side rails, and consistency of supervision over 24-hour periods significantly impact safety outcomes in this

population. Research focused in the community setting is greatly needed as the demographics of aging Americans result in higher levels of PWD living in the home.

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Table 1

Types of Injuries Sustained

Injury Type	Number	Percent
Fractures	4	13.8
Bruises, contusions, and crushing type with skin intact	8	27.6
Scratches and abrasions	8	27.6
Cut, lacerations, open wound punctures	3	10.3
Sprains and strains	4	13.8
Unknown	2	6.9
Total number of injury events	29	
Total number of subjects sustaining any injury	16	30.0