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Original Study

Agreement Between Video Footage and Fall Incident Reports on the Circumstances of Falls in Long-Term Care

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A B S T R A C T

Objective: Incident reports guide fall prevention efforts in long-term care (LTC) facilities, often based on descriptions of how falls occurred. The validity of these reports is poorly understood. We examined agreement on fall characteristics between fall incident reports and analysis of video footage of real-life falls in LTC.
Design/Setting/Participants: Video capture of 863 falls (by 309 individuals) over 6 years in common areas of 2 LTC facilities in British Columbia.
Measurements: We reviewed each fall video with a previously validated questionnaire to determine the cause of imbalance leading to the fall, activity at the time of falling, and use of mobility aids. These data were compared with corresponding information recorded by staff on fall incident reports.
Results: There was agreement between video analysis and incident reports on the cause of imbalance in 45.5% of falls (kappa = 0.25), on activity at time of falling in 45.1% of falls (kappa = 0.22), and on use of mobility aids in 79.5% of falls (kappa = 0.59). When compared with video analysis, incident reports overreported falls due to slips, and falling while rising and while using a wheelchair or walker. Incident reports also underreported falls due to hit/bump and loss-of-support, and falling while standing and sitting down.
Conclusion: In more than 50% of falls, we found discrepancies between fall incident reports and analysis of video footage on the cause of imbalance and activity while falling. Emerging technologies incorporating video capture or wearable sensors should improve our ability to understand the mechanisms and improve the prevention of falls in LTC.

Falls are the most frequently reported adverse incident in long-term care (LTC) facilities.[1] Nearly 50% of older adults residing in LTC will fall each year.[2] The complex medical status of residents causes rates of falls and fall-related injuries in LTC to be two-to threefold higher than among community-dwelling older adults.[3,4] The annual cost for treating hip fractures in Canada is $1.1 billion, with a disproportionately high portion in LTC.[5] Clearly, developing improved strategies to decrease the frequency and consequences of falls in LTC is an essential health priority.

A major barrier to fall prevention is insufficient knowledge on the causes and circumstances of falls. Our current understanding of falls in the residential and acute care settings relies on incident reports,[6–9] which are completed by care staff who may interview the faller or witnesses.[7,8,10] Fall incident reports are mandated by law in British Columbia and a condition for accreditation of LTC facilities.[11] The reports must describe the time and location of the fall, and associated injuries. They also must describe steps toward fall prevention. With regard to the latter, the reports often probe the cause and activity at time of fall, use of mobility aids, and associated environmental

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hazards.[7,12–14] However, the accuracy of these data has been questioned,[15,16] given that many falls are unwitnessed and the challenges for older adults, especially those with cognitive impairment, in accurately recalling and describing the circumstances of falls.[17,18] Better understanding of the accuracy of fall incident reports may lead to improved approaches toward monitoring and prevention of falls in LTC.

Video capture can provide objective evidence of the characteristics of falls[19–21] for comparison with incident reports. We recently[19] described the circumstances of 227 real-life falls from 130 individuals captured on video in common areas in 2 LTC facilities using a structured, validated questionnaire.[22,23] Using a larger video database of 863 falls in 309 residents, our goal in the current study was to examine the agreement between the characteristics of falls described on incident reports and the characteristics emerging from analysis of video footage of the same falls.

Methods

Setting

This study was approved by the Research Ethics Boards of Simon Fraser University and the Fraser Health Authority in British Columbia. Data were collected from 2 LTC facilities in the greater Vancouver area, affiliated with the Fraser Health Authority: Delta View Life Enrichment Centre, a 312-bed, for-profit facility located in Delta, BC, and New Vista Society Care Home, a 236-bed, not-for-profit facility located in Burnaby, BC. In British Columbia, approximately 35% of LTC facilities are for-profit, and 65% are not-for-profit,[24] and the average size of facilities is 87 beds, placing our 2 facilities in the large category. The average number of hours of care per resident day was 2.72 at New Vista and 3.06 at Delta View (Table 1), which is similar to the averages reported previously for LTC in British Columbia[24] and the United States.[25,26] As described previously,[23] residents from these 2 facilities were similar in demographics and the prevalence of disease diagnoses (Table 2) to residents at 35 LTC facilities owned and operated by Fraser Health.

Fall Incident Reports

At both facilities, the occurrence of a fall triggered care personnel (licensed nurses) to complete a structured incident report within 24 hours of the event. The incident report was developed by the research team and care staff at the start of the study, to ensure consistency in the questions and responses, and capture the information common to incident reports in LTC facilities in the Fraser Health Authority. The report documented the time and location of the fall, associated injuries, and information related to the cause of imbalance leading to the fall, the activity at the time of falling, use of mobility aids, and whether the fall was witnessed (Table 3).

Video Capture of Falls

At the time of admission to the facility, each resident or proxy provided permission for the facility to acquire video footage in common areas, for the purpose of resident safety. These data, along with fall incident reports, were shared as secondary data with our team. Members of our research team communicated daily with care personnel to review incident reports, identify falls occurring in common areas, and retrieve corresponding video footage (Figure 1, and sample video clips - Video 1 and Video 2). Both facilities had a total number of 264 cameras that were networked to digital video recorders, which stored video data at a minimal resolution of 640 × 480 pixels and a frame rate of 15 to 30 frames per second.

Table 1
Characteristics of New Vista and Delta View LTC Facilities in this Study

Characteristic	New Vista	Delta View
Type of ownership		
Funding model	Non-profit, 100% publically funded residents	For-profit, 70% publically and 30% privately funded residents
Age of facility, y	39	10
Size of facility	236 beds	212 beds
Licensing	Licensed by Fraser Health Authority, Province of British Columbia	Licensed by Fraser Health Authority, Province of British Columbia
Staff/resident ratio	1.0/3.1	1.0/2.2
Staffing levels		
No. of licensed physiotherapists	1	1
No. of LPNs - in morning shift	7	5
in afternoon shift	7	4
in night shift	2	3
No. of RNs - in morning shift	2	6
in afternoon shift	2	4
in night shift	1	1
No. of care aids - in morning shift	27	32
in afternoon shift	18	32
in night shift	10	8
Average hours of care per resident day	2.72	3.06
Percentage of resident turnover per year, %	21	33
Average length of stay of residents, y	3.88	3.47
Percentage of residents with dementia, %	47	58
Ambulatory status of residents, %		
Independent	31	31
Dependent	69	69
Fall rates (rate/1000 bed-days)	8.9	9.2

LPN, licensed practical nurse; RN, registered nurse.

Between April 2007 and May 2013, we collected and analyzed video footage of 894 reported falls. Thirty-one of these cases (3%) were excluded because they involved the residents appearing to intentionally sit or lay down on the floor, which violates the standard definition of a fall being an "unexpected event."[27] For the other 863 falls experienced by 309 different residents, 47% (n = 401) occurred in dining areas, 25% (n = 216) occurred in hallways, 24% (n = 211) occurred in lounges, 3.4% (n = 30) occurred in activity rooms and nursing stations, and 0.6% (n = 5) occurred outside the facility.

Table 2
Comparison of the Characteristics of Participants in This Study and all Residents at New Vista and Delta View LTC Facilities

	New Vista Residents, n = 235	Delta View Residents, n = 211	Study Participants With Documented Diagnoses, n = 231 Residents
Demographics			
Age, y, mean (SD)	83.1 (9.6)	81.7 (11)	80.3 (11)
Female, n (%)	164 (69.7)	132 (62.5)	140 (60.6)
Disease diagnoses, n (%)			
Alzheimer disease	45 (19.1)	59 (28.0)	32 (29.6)
Diabetes	46 (19.6)	55 (26.1)	45 (19.5)
Cardiac arrhythmia	7 (3.0)	6 (2.8)	7 (3.0)
Hypertension	117 (49.8)	107 (50.7)	87 (37.7)
Hypotension	1 (0.4)	2 (0.9)	1 (0.4)
Stroke	35 (15.0)	43 (20.4)	26 (11.3)
Parkinson disease	10 (4.3)	8 (3.8)	16 (6.9)
COPD	34 (14.5)	26 (12.3)	25 (10.8)