

Ten years of EMS Fall Calls in a Community: An Opportunity for Injury Prevention Strategies

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Abstract

Objective: To determine whether fall calls, lift assists, and need for transport to the hospital over the past 10 years in one emergency medical services (EMS) system have altered coincident with demographic changes and to estimate health-care cost for lift assists. **Methods:** We conducted a retrospective chart review of EMS fall-related care. The HealthEMS database for a suburban community surveyed was queried from March 1, 2007, to March 1, 2017. Fall-related calls in patients 60 years or older were identified and determined to be either lift assists (calls that do not result in transport) or fall calls that resulted in transport to the hospital. **Results:** Of the 38 237 EMS care responses in patients 60 years or older, 11.5% were related to falls. Fall calls increased by 268% over the past 10 years ($P = .0006$), yet the number of transports to the hospital significantly decreased over time ($P = .02$). Lift assists increased significantly ($P = .0003$), nearly doubling over the decade. At the same time, fall calls that did not result in transport to the hospital cost the community an estimated US\$1.5 million over a 10-year period. **Discussion:** There has been a dramatic shift in fall-related calls to EMS in older individuals with more frequent calls for lesser acuity needs. Utilization of EMS for lift assists has substantial financial consequences and diverts care from calls that need immediate triage and transport to care. **Conclusion:** Future work to reduce the frequency and increase the impact of EMS lift assists could have a significant cost benefit and provide opportunity for enrollment in appropriate community services and fall prevention programs.

Keywords

fall calls, lift assists, EMS, resource allocation, fall prevention

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Introduction

Falls are the leading cause of injury and result in 40% of hospitalizations in older adults in the United States, with costs related to falls expected to reach more than US\$30 billion annually by 2020.¹ One in 7 falls in older adults results in fragility fracture (fractures that result from low-energy falls) and, despite improvements in surgical and medical management techniques, up to 50% of fragility fracture patients show substantial decline in daily function and have up to a 30% risk of mortality within 1 year.²⁻⁵ Fracture prevention for falls is difficult because it is challenging to identify who is at high risk for falls prior to an actual fracture.

Emergency medical services (EMS) are often called for older patients who experience a fall or require assistance for mobility. When individuals utilize EMS for a fall or assistance up to a more mobile position from the ground but do not require transport for medical care, the response is deemed a “lift

assist.”^{6,7} Utilization of EMS for fall-related calls that do not result in transport for a patient has led to substantial financial consequences to communities and decreases availability to respond to higher acuity related calls that need immediate triage and transport to care. Nearly 50% of lift-assist calls (falls calls that do not result in transport) result in a second lift-assist call within 2 weeks, many of which do result in transport to the hospital at the second visit.⁶ In addition, lift-assist calls are associated with increased morbidity and mortality within 14 days of a lift-assist call.⁷ Emerging evidence indicates that the

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“lift assist” call should be considered a sentinel event and perhaps serve as a trigger for additional assessment and intervention to prevent injury, medical deterioration, and disability to older patients within a community.⁸

Currently, there are limited demographic data on lift-assist calls for older adults and whether the utilization of EMS providers for fall-related calls has changed over the past few years. In addition, there are no standard practice guidelines in the United States to determine proper triage of whether a lift-assist call should result in transport or referral for further medical services in the United States. The goals of this study were to (1) evaluate lift assists (calls for transfer needs or falls that do not result in transport) over the past 10 years in 1 suburban EMS system; (2) determine whether fall calls, lift assists, and need for transport to the hospital have changed coincident with demographic changes; and (3) provide a gross estimation of health-care burden cost for lift assists.

Methods

This study was conducted in Maplewood, Minnesota, a suburban community near a large metropolitan area, with a population of approximately 40 567, and 15.2% of population aged ≥ 65 years old. The older adult population is similar to United States as a whole (15.2%).⁹ The community has a fire department-based EMS first-response system that responds to approximately 3800 EMS calls per year and provides basic and advanced life support and transport to local hospitals.

As part of a patient and quality improvement process for the Maplewood community, the EMS electronic database (HealthEMS, Duluth, Minnesota) was queried from March 1, 2007, to March 1, 2017, for all EMS care response records for the Maplewood catchment area. HealthEMS is a mobile data collection, management, and reporting software program for fire and EMS for prehospital patient care. The search terms included falls, lift assists, medical alarms, and all EMS runs for the designated age. The data were exported as a single Excel spreadsheet and provided to the investigators with only the total number of calls within each category, and no transmission of patient information was provided for analysis. Calls that were not related to falls were removed from data analysis if chart review deemed that the call was not related to a fall or lift assist type call (ie, syncopal episode or cardiac event). The project was deemed exempt from full institutional review board approval as the data were retrospective and deidentified, provided after the completion of a quality review by the EMS department. The data in this cohort included EMS responses to private residences, nursing facilities, and public locations in order to fully capture the older adult population that the local EMS provided for falls. Patients were included in the study if they (1) were ≥ 60 years of age, (2) were evaluated within the Maplewood catchment area, and (3) had an EMS care response for a fall or lift assist during the study period. Patients were excluded if they were younger than 60 years of age and if their care response was for something other than a fall or lift assist.

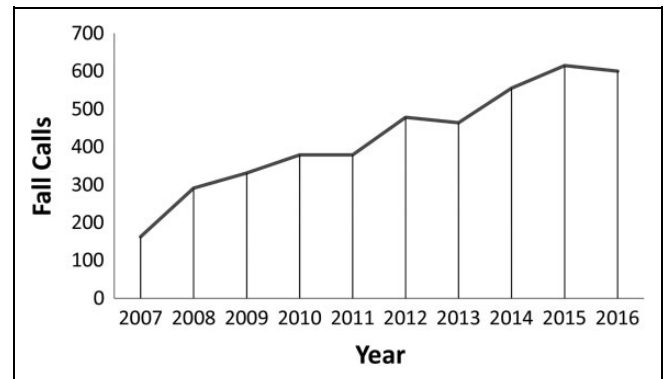


Figure 1. Number of emergency medical service fall calls in a suburban community over a 10-year span.

A financial cost analysis was also performed over the study period. In the community, lift assists are not charged to the patient; rather, the taxes within the community absorb the lost revenue related to EMS responses that do not result in treatment or transport for medical needs. Although not billed to the patient, the burden on the health-care system can be substantial in terms of gas, mileage on transport vehicles, and costs of staff time for response. At the permission of the chief of EMS, a gross cost analysis was conducted by the Maplewood EMS as part of a presentation to the community to encourage prevention strategies. The cost per lift assist run was estimated based on cost estimates for average distances for EMS runs, cost of gas per mile, average time spent at lift assists and fall calls, and hourly wage of EMS providers. The cost analysis was provided as a gross estimation to the investigative team, and no financial data details were provided for analysis of this study.

Fall-related calls were then categorized as (1) lift assists (calls for transfer needs or falls that did not result in transport) or (2) fall calls that resulted in transport to the hospital. Fall-related calls were recorded for total numbers and proportions of all EMS calls. In addition, using US census data, the estimated total change in population (65 years of age or older) was evaluated over the 10-year time period. Using Excel 2013 (Microsoft, Redmond, Washington) and SPSS version 24, 2016 (IBM, Chicago, Illinois), tests of normality, descriptive statistics of proportions, Student *t* tests, and percentage changes were performed to analyze the data.

Results

The EMS team provided 38,237 care responses over a 10-year time period for community members 60 years of age or older. Of the 38 237 responses, 4399 (11.5%) of the responses were related to falls in community members 60 years of age or older. The EMS fall calls in the community significantly increased over the past 10-year span ($P = .0006$; Figure 1). At the same time, the census of community members (aged 65 or older) also significantly increased ($P = .002$). Although both the number of community members and fall calls significantly increased

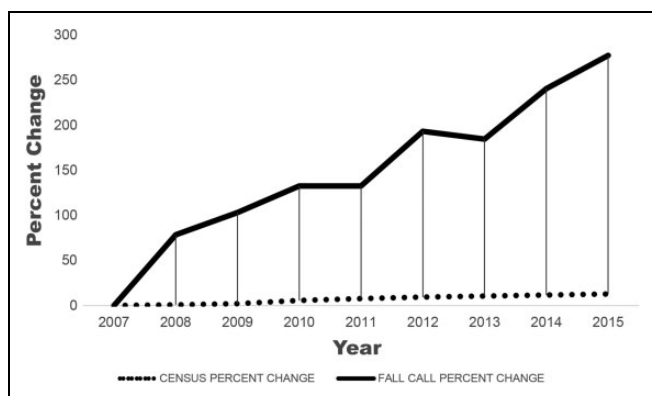


Figure 2. Percentage change in census for people age 65 and older in the community compared to the percentage change in fall-related calls to emergency medical services in the community.

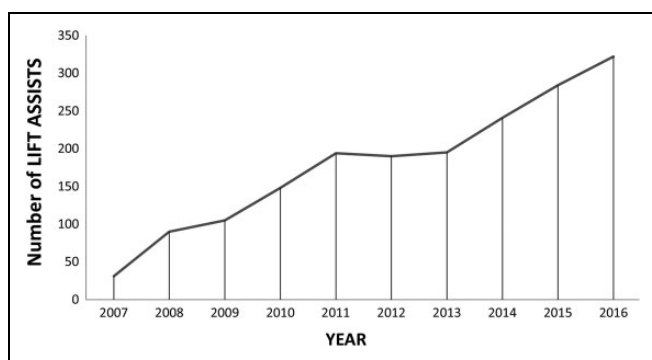


Figure 3. Number of lift assists per year over a 10-year span.

over the decade of study, there was a 268% increase in fall calls compared to only a 15% increase in the census (Figure 2).

Overall fall-related calls increased over the decade. However, the number of transports to the hospital significantly decreased over time ($P = .02$). Instead, lift assists (fall calls that did not result in transport) increased significantly over the 10-year span ($P = .0003$; Figure 3), nearly doubling from 2007 to 2016. Figure 4 demonstrates how lift assists compared to transports for fall calls changed over the 10-year span, with fall calls increased while transport rate to higher level care decreased over time.

A cost of care analysis was also performed to grossly define the cost of a lift assist to the EMS system. The total cost of an EMS run that did not result in treatment was determined to be approximately US\$825. Extrapolation of the cost per run over the 10-year span demonstrates an estimated US\$1.5 million cost to a mid-sized suburban community over the past decade due to fall calls that did not result in transport to the hospital.

Discussion

Falls in older adults can be catastrophic and lead to profound changes in mobility, ability to care for oneself, and overall life expectancy for an individual. The results of the current study demonstrate, that over the past decade, there has been a marked

increase in fall calls to EMS for patients 60 years of age or older. However, the transport rate to hospitals for care after fall calls have significantly decreased and instead EMS is increasingly being used to provide lift assists. Our findings are similar to Cone et al, which found that lift-assist calls are increasing in frequency, are associated with substantial utilization of EMS services,⁶ and may be early indicators of greater health problems requiring medical attention.

Utilization of EMS for lift assists is costly and diverts care from higher acuity-related calls that need immediate triage and transport to care. After helping a patient up from a position of immobility during a lift assist, usually no significant intervention is offered or available to prevent the event from happening again. Approximately 50% of patients who require a lift assist by EMS have a subsequent EMS evaluation within 14 days.⁶ Even more concerning, a recent study in the United Kingdom found that more than one-third of older patients attended to by paramedics for falls had further emergency visits or died within 1 month, and this increased to two-thirds of patients within 6 months.⁸

There is a large body of evidence that demonstrates that interventions can reduce risk and rates of falls.¹⁰ However, recruitment and enrollment of patients into fall prevention programs are challenging.¹¹ Often older individuals are not recognized as high risk for falls until a serious injury occurs, and at that point fall prevention strategies may not be possible as the patient recovers from the significant event. At times of vulnerability, such as a recent fall, patients are likely more motivated to participate in fall prevention and bone health maintenance strategies. In our current culture, interventions for falls are often reactive instead of proactive and preventative. In order to prevent falls and subsequent fall-related injuries, we must fully understand the underlying biopsychosocial factors that result in falls and develop more robust strategies to intervene prior to a fall.

As people age, most older adults prefer to live independently in their own homes as long as possible. However, for individuals to do this safely, it often requires a supportive social environment. Community and volunteer programs often provide services such as meals, transportation, and welfare checks to allow for individuals to remain in their homes. In many cases, the aging community relies on family, neighbors, and EMS if a fall occurs in the home. Screening patients at high risk for falls in their home environment could provide significant insight into what modifiable risk factors could reduce individual patient risks for falls.¹²

Prospective screening of home environments of older patients who called EMS/fire services for assistance demonstrates that EMS observations provide significant insight into the safety and health of older individuals.¹² Emergency medical services providers have the unique opportunity that many care providers do not: to look, listen, and get a feel for the patient’s living environment. There is mounting evidence that biopsychosocial variables such as frailty, nutrition, social support, and cognitive impairment affect medical outcomes for older patients.^{13,14} However, many of these variables are

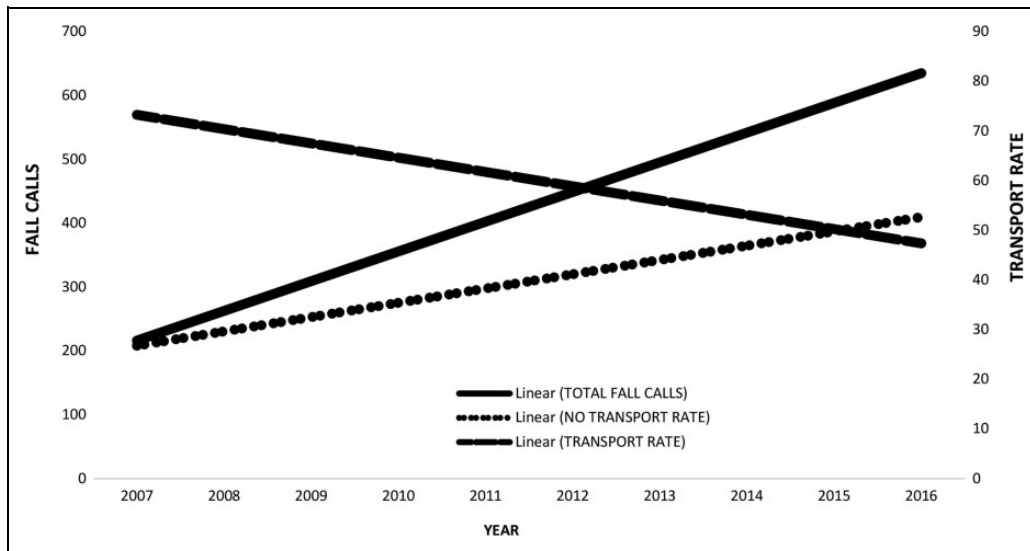


Figure 4. Trends in fall calls over a 10-year span. The lines indicate the overall trend line of the data points for each year.

difficult to identify and treat in the hospital or outpatient clinic environment. Instead, utilizing EMS to screen and help enroll patients in programs to reduce fall risks and optimize medical strategies could be a paradigm change in how we treat older patients in the community.^{8,15-18}

Recent studies have found that EMS referrals to community fall prevention programs can reduce future falls, improve clinical outcomes, and be cost-effective.^{19,20} The Support and Assessment for Fall Emergency Referrals (SAFER 1 and 2 trials) in the United Kingdom have examined the effectiveness and safety of using computerized clinical decision support to help determine triage for older adults in the community who fall and to determine effectiveness of paramedic referral to fall prevention services after a lift-assist call.^{8,18,21} These new innovative models of care that leverage a lift assist to better inform patients and the community on the needs of older patients could significantly affect our treatment strategies for patients who fall in their home environments. Reducing the number of paramedic runs for lift assists may have a significant cost benefit to the local community and provide transformation care strategies for prevention strategies that may otherwise not be possible.

Limitations and Future Work

The goal of this current study was to determine whether EMS fall calls, lift assists, and need for transport to the hospital have changed over the past decade. This retrospective review provides important information on how EMS utilization has changed for older adults over the past 10 years in a suburban town in the Midwest and may not be generalizable to other geographic locations or all EMS-type services. Although a national study utilizing a large database with EMS fall call data would be ideal, the current data collection around fall calls in the United States is somewhat limited. The National EMS Information

System (NEMSIS) could provide valuable insight into understanding more generalizable trends across the United States for fall-related calls. However, the database is limited in availability for data prior to 2009 and the definition for lift assists and fall calls can vary widely between EMS facilities making compilation of data prone to significant differences in how the types of calls are coded and difficulty in quality control of the data. Faul et al queried the NEMSIS database in 2014 and 2015 for fall calls seen by EMS in 42 states and found that 20% of patients who fell were not transported.²² However, they noted that although the data provided unique insight into falls and EMS transport activity, the data were a convenience sample and that due to limitations of the study, the data should be interpreted with caution. Interestingly, our data in the current study demonstrate a transport rate of about 75% in earlier years to 50% in 2014 that continues to trend down to 40% when followed out to 2016. The frequency in transport in the current study population changed over the years and demonstrates that the snapshot provided by the NEMSIS database in 2014 and 2015 may potentially underestimate the number of lift assists occurring in older adults. Thus, future work that investigates national trends may further delineate the costs and resources utilized for falls within communities in the United States and could potentially help target intervention strategies.

For the current study, the community selected has a similar census of adults over the age of 65 to the overall national percentage (15.2%). For this study, the age cutoff of 60 years or older was selected rather than the age of 65 in order to provide a wider capture for older adults who are at high risk for falls. Many studies that evaluate osteoporotic fracture risks from low-energy falls consider participants as young as 50 as high risk for fragility fractures. Chronological age does not necessarily account for the frailty an individual may have related to chronic illness, malnutrition, and other medical issues that may place an older adult at risk for falls. For

this study, age 60 was chosen because it is the age at which many physicians target fall prevention seminars and strategies.

The retrospective nature of this study makes it difficult to fully evaluate the causality of fall calls to EMS. Although EMS providers are all provided a dispatch concern, coding for fall calls within the HealthEMS can be categorized into different subheadings (such as lift assists or fall) and is determined by individual providers. If a syncopal episode resulted in a fall, it is possible that it may have been coded as a syncopal episode or a fall. It is difficult to retrospectively review EMS reports and determine that fall calls are accurately coded, as some of the “falls” related to syncope or other medical issues may have been coded in another format. Future work should focus on prospective studies to minimize coding ambiguity and capture more detailed biopsychosocial variables that may affect whether a patient is transported to the hospital. In addition, triage for transport to the hospital is not standardized in the United States for fall-related calls. Instead, EMS providers are expected to make clinical judgment calls on whether patients are safe to remain at home and do not require further medical evaluation. This study highlights the importance of developing more robust, objective criteria to help with clinical decision-making for fall-related calls in order to help improve morbidity and mortality in older adults.

Finally, although we were able to determine a gross estimation of costs for lift assists to a suburban, Midwestern community, we did not perform a robust cost analysis that could be generalizable nationwide. Geography, resources available to specific communities, and EMS activation strategies can variably considerably across the United States. For the current study, EMS time was included as part of the cost analysis. Including paramedic time into cost analyses may overestimate costs since it assumes that an EMS provider would otherwise be waiting for an emergency call. However, depending on the EMS facility, many have other duties in addition to serving as a “first responder” including community education, fire duties, trauma-related calls, and covering events such as concerts, sporting activities, fairs, and many other coverage expectations. Diversion to lower acuity events from traumas and other first responder duties may lead to missed revenue activities and nonreimbursable time commitments. In addition, there is a new model of care evolving in the EMS community called community paramedicine, where first responders receive special training to use time between emergency events to provide health delivery for chronic illnesses such as diabetes management, chronic heart failure, fire and fall prevention, and health-care education to local communities. Due to the potential loss in revenue-generating activities for an EMS department, we felt inclusion of time better estimated the costs for lift assists in communities. Future economic analyses that evaluate fall-related calls in older adults could substantially affect models of care for communities with older adults at high risk for falls.

Conclusions

Emergency medical services fall calls with need for lift assists have increased in frequency over the past 10 years. Currently, in the United States, there are no standard practice guidelines to determine proper triage of whether a fall call should result in transport to the hospital or referral for further medical services. Emergency medical services fall calls for older patients should be considered a sentinel event, which could serve as a trigger and opportunity for additional assessment or intervention to prevent injury, medical deterioration, and disability. Fall prevention strategies for older adults are often reactionary instead of proactive and preventive. In order to prevent falls and subsequent fall-related injuries, we must fully understand the underlying biopsychosocial and environmental factors that result in initial and subsequent falls in this population and develop more robust strategies to intervene prior to a fall. The results from this study indicate that a better understanding of the nature of lift assist and fall calls for older adults may help reduce unnecessary resource utilization for the first responder community and redirect those resources to implement nationwide fall-prevention strategies to decrease fall-related deaths and disability.

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Declaration of Conflicting Interests

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