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Improving Decisions About Transport to the Emergency Department for Assisted Living Residents Who Fall

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Background: Residents of assisted living facilities who fall may not be seriously ill or injured, but policies often require immediate transport to an emergency department regardless of the patient's condition.

Objective: To determine whether unnecessary transport can be avoided.

Design: Prospective cohort study.

Setting: One large county with a single system of emergency medical services.

Participants: Convenience sample of residents in 22 assisted living facilities served by 1 group of primary care physicians.

Intervention: Paramedics providing emergency medical services followed a protocol that included consulting with a physician by telephone.

Measurements: The number of transports after a fall and the number of time-sensitive conditions in nontransported patients.

Results: Of the 1473 eligible residents, 953 consented to participate in the study (mean age, 86 years; 76% female) and 359 had 840 falls in 43 months. The protocol recommended nontransport after 553 falls. Eleven of these patients had a time-sensitive condition. At least 7 of them received appropriate care: 4 requested and received transport despite the protocol recommendation, and 3 had minor injuries that were successfully managed on site. Three additional patients had fractures that were diagnosed by outpatient radiography. The final patient developed vomiting and diarrhea, started palliative care, and died 60 hours after the fall. At least 549 of the 553 patients (99.3% [95% CI, 98.2% to 99.8%]) with a protocol recommendation for nontransport received appropriate care.

Limitation: The resources required for this program will preclude use in some locations.

Conclusion: Shared decision making between paramedics and primary care physicians can prevent transport to the emergency department for many residents of assisted living facilities who fall.

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Unintentional falls are the leading cause of nonfatal injury for adults aged 65 years or older who are treated in emergency departments in the United States, with more than 10 million such falls from 2011 to 2014 (1). Most of these patients do not require hospital admission—approximately 70% are treated and released from the emergency department (2). Many older adults who fall reside in assisted living facilities, some of which have policies requiring emergency medical transport to an emergency department for evaluation regardless of the fall's severity or circumstance. This policy burdens the health care system and increases the risk for adverse consequences for otherwise uninjured patients, who have more diagnostic tests, remain in the emergency department longer, and incur higher charges than younger patients (3). In addition, iatrogenic complications and nosocomial infections can occur during emergency department evaluations, particularly for elderly patients (4).

We hypothesized that onsite evaluation and treatment by paramedics and a primary care physician for residents of assisted living facilities who have simple falls would decrease the risk for transport, improve patient outcomes, and reduce health care costs. We created a protocol for minimizing unnecessary transport of residents in assisted living facilities who had ground-level falls. We evaluated the protocol using retrospective data and concluded that its use might reduce unnecessary transports by half (5). The study we report here prospectively evaluates that protocol. The protocol's central feature is a collaboration between the paramedics who provide emergency medical services and the patients' primary care physicians.

Methods

Study Setting and Population

We did this study in 22 assisted living facilities in Wake County, North Carolina, in partnership with Doctors Making Housecalls and Wake County Emergency Medical Services. Wake County has an area of 854 square miles and a 2015 census population of 1 024 198. It includes Raleigh, the state capital; Cary, the third-largest city in the Research Triangle area; and 10 other municipalities.

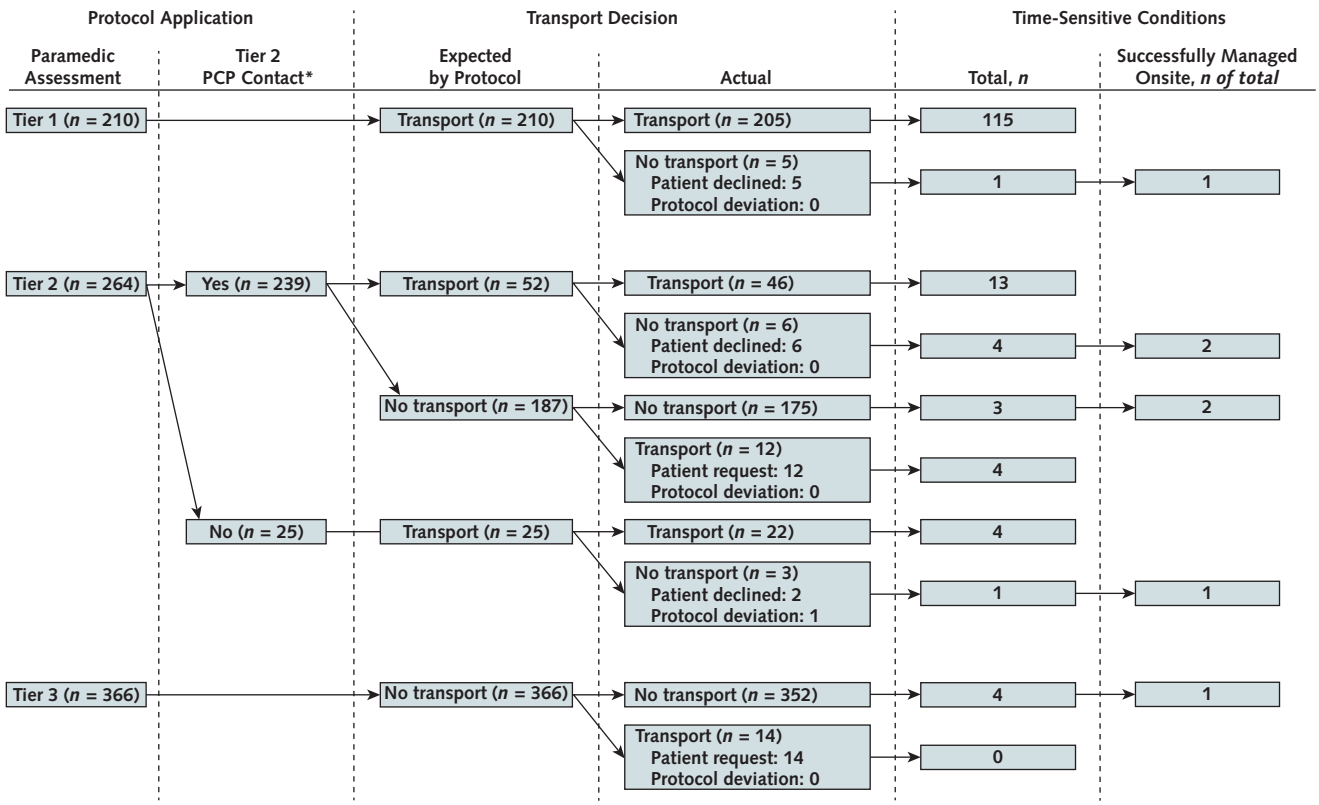
See also:

Editorial comment 1
Summary for Patients 2

Web-Only

Supplement

Figure. Protocol tiers and patient progression and outcomes.



Tier definitions: 1 = Uncontrolled hemorrhage; acute neck pain or inability to clear spine due to mechanism; pulse >120 beats/min and/or systolic blood pressure <90 mm Hg (with consideration for patient's normal baseline and medications); mental status altered from baseline; acute emergency condition (e.g., stroke, ST-segment elevation myocardial infarction, syncope, seizure); hip pain without full range of motion, with shortening/rotation, and/or with change in ambulatory status. 2 = Fall while receiving anticoagulant or antiplatelet, excluding aspirin; borderline vital signs or orthostatic; acute pain or need for pain management not already in patient medication regimen; patient's mental status prevents examination; isolated abnormal laboratory value; extremity splinting required; presence of obvious injury more severe than simple contusion or skin tear. 3 = Simple contusion or skin tear, no complaint; no obvious injury; no hip pain, has full range of motion, no shortening and/or change in ambulatory status. PCP = primary care physician.
* Although not required by the protocol, PCP contact was also made for 55 tier 1 and 299 tier 3 patients.

The 22 assisted living facilities in this study are dispersed throughout the county; each serves between 60 and 220 residents. The primary care physicians for roughly 60% of the residents in these facilities are from Doctors Making Housecalls. This primary care practice has more than 85 experienced, board-certified primary care physicians who make more than 100 000 home visits per year throughout North Carolina. These clinicians specialize in onsite care for older patients with multiple, complex medical problems; 85% of the patients live in assisted living facilities or independent living communities. The practice provides primary and urgent care 7 days a week, with same-day or next-day appointments for urgent problems.

Wake County Emergency Medical Services is an advanced life support system that dispatches at least 1 ambulance staffed by at least 1 paramedic to more than 100 000 calls for emergency services each year. It also operates an advanced practice paramedic program that sends an additional paramedic to high-acuity calls and other selected events, including falls at assisted living facilities. Advanced practice paramedics do not have an expanded scope of practice, but they do have additional training in medical decision making, patient navigation, and the availability of community resources.

Patients were eligible for the study if they resided in 1 of the county's 22 participating assisted living facilities and their primary care physician was part of the Doctors Making Housecalls network. Each patient's primary care physician informed the patient or his or her health care power of attorney of the study during usual care. Patients choosing to participate or their powers of attorney signed a consent document, which was scanned into the electronic medical record. Consenting patients were included in the study if they subsequently had a ground-level fall at their assisted living facility and emergency medical services dispatched an ambulance with an advanced practice paramedic according to the procedure specified by Medical Priority Dispatch System card 17 (**Supplement Figure 1**, available at Annals.org).

The WakeMed Health & Hospitals institutional review board approved the study.

Patient Assessment and Disposition

The protocol used in this study to make decisions about transport (Supplement Figure 2, available at Annals.org) was developed by consensus among leaders of Doctors Making Housecalls and Wake County Emergency Medical Services (5). If an ambulance was dispatched to an address known to be an assisted living facility with study patients, an advanced practice paramedic was also automatically dispatched. If the advanced practice paramedic and ambulance crew found a study patient who had had a ground-level fall, they did their usual history and physical examination and then assigned the patient to 1 of the protocol's 3 tiers (Figure and Supplement Figure 2). The protocol recommended transport to an emergency department for tier 1 patients and no transport for tier 3 patients. Patients without a clear transport indication were assigned to tier 2. The advanced practice paramedic could decide to transport a tier 2 patient or, alternatively, to contact a primary care physician for a collaborative discussion about disposition. All patients were either transported to the emergency department or scheduled for a visit with a primary care physician within 18 hours of the call for emergency medical services. Patients were allowed to decline transport to the emergency department regardless of the protocol's recommendation. The protocol also allowed but did not require paramedics to contact the on-call primary care physician for tier 1 and 3 patients.

Study personnel provided 1-hour continuing education sessions to help advanced practice paramedics learn how to use the protocol and how to collect data about their patient assessments and the patients' dispositions using a standardized software program that was incorporated into the emergency services electronic medical record (Supplement Table, available at Annals.org). This information was then uploaded into the study's database.

Outcome Measures

We focused on clinically important outcomes, which is a pragmatic approach previously reported in evaluations of other clinical decision tools (6, 7). The study's primary outcome was a "time-sensitive condition," which we defined as any of the following: a wound requiring repair, any fracture, admission to an intensive care unit, requirement for an operating room or cardiac catheterization laboratory, or death from any cause within 72 hours of the fall.

Study personnel collected information about each patient's course during the 72 hours after the fall from medical records maintained by Doctors Making Housecalls and from hospital records. They added this information to the study's database (including information about the length of stay for hospitalized patients). These personnel were not involved in the care of study patients and were not aware of the paramedics' evaluations of patients or the protocol recommendations for patient transport.

Statistical Analysis

Data Analysis

We treated each fall as an independent event, even when the same patient had more than 1 fall. We used descriptive statistics (frequencies, means with SDs, and medians with interquartile ranges) to summarize the data. We classified any patient who received emergency department care as having received appropriate care. We also classified patients as having received appropriate care in cases of minor wounds or simple, nondisplaced fractures that were successfully managed by the primary care physician on site at the assisted living facility within 18 hours of the fall.

Sample Size Calculations

The a priori sample size was calculated on the basis of the results of our retrospective protocol evaluation. Given an expected negative predictive value (NPV) of 96% and a 30% prevalence of time-sensitive conditions, we estimated that a total sample size of 1516 falls would be needed to achieve a 95% CI around the NPV with a width of ±2% (8). As the result of a planned interim safety analysis and several institutional review board progress reports, it became clear that participant accrual was slower than anticipated, time-sensitive conditions were less prevalent than expected (about 20% vs. about 30%), and our a priori outcome of a time-sensitive condition was too strict: It included minor injuries, such as nondisplaced fractures or small wounds, that did not require hospital care and that patients and primary care physicians preferred to manage at the facility. Thus, we did an unplanned recalculation of the required sample size based on an expected NPV of 96% and a 20% prevalence of time-sensitive conditions and allowing for a wider CI around the NPV. We determined that 825 falls would enable calculation of a 95% CI for NPV with a width of ±4%.

Role of the Funding Source

This study received no external funding.

RESULTS

Between November 2012 and May 2016, primary care physicians asked 1473 of their patients (or the health care power of attorney) to participate in the study; 953 (64.7%) agreed. During the study, 359 patients had 840 ground-level falls (median number of falls per patient, 2; interquartile range, 1 to 3; maximum, 17). The demographic characteristics and medical histories of the 359 patients (Table 1) were similar for those with and without a protocol recommendation for nontransport and for those with and without a time-sensitive condition.

The Figure shows how the protocol classified patients for transport, whether patients were actually transported, and how many time-sensitive conditions occurred in transported and nontransported patients. Table 2 describes the type of time-sensitive conditions in transported and nontransported patients.

Table 1. Patient Demographic Characteristics*

Characteristic	Patients (*n* = 359)	Fall Encounters (*n* = 840)			
		Protocol Recommendation		Time-Sensitive Condition	
		Transport (*n* = 287)	No Transport (*n* = 553)	Yes (*n* = 142)	No (*n* = 698)
Mean age (SD), y†	85.5 (8.3)	84.8 (8.7)	85.8 (8.0)	85.0 (8.7)	85.6 (8.1)
Sex‡					
Male	23.7	18.3	28.3	14.8	27.0
Female	76.3	81.7	71.8	85.2	73.0
Race§					
White	92.2	91.3	89.1	92.1	89.4
Black	6.4	8.2	8.7	5.7	9.0
Other	1.4	0.5	2.2	2.3	1.6
History					
Falls	88.9	92.3	93.7	93.3	93.2
Dysrhythmia	20.6	19.2	16.1	23.5	15.8
Fracture	10.7	15.3	8.2	20.8	8.4
Dementia	93.0	96.5	94.8	98.0	94.8
Depression	38.2	37.4	34.2	37.8	34.8
Anxiety	48.3	47.4	48.1	51.4	47.1
Diabetes	18.9	13.6	18.6	12.2	18.0
CNS disease	21.2	19.6	20.0	16.2	20.6
Prescriptions					
Anticoagulant	6.7	8.0	8.1	8.1	8.1
Antiplatelet	8.6	7.3	7.2	5.4	7.7
Cardiac	63.5	55.8	60.2	57.7	58.9
Narcotic	19.8	24.4	18.1	25.5	19.1
Sedative	64.6	66.9	67.3	73.8	65.7

CNS = central nervous system.
* At time of first encounter. Values are percentages unless otherwise indicated. Percentages may not sum to 100 due to rounding.
† Not documented for 11 patients and 49 falls.
‡ Not documented for 59 patients and 181 falls.
§ Not documented for 78 patients and 242 falls.

Outcomes of Patients Recommended for Nontransport

Of the 840 falls, the protocol recommended no transport for 553 (366 tier 3 falls and 187 tier 2 falls). Eleven of the patients recommended for nontransport had a time-sensitive condition (NPV, 98% [95% CI, 96.5% to 99.0%]) (Table 3). The paramedic discussed 9 of these 11 patients with the primary care physician. Of the 11 patients, 4 requested and received transport despite the protocol recommendation and 3 had minor injuries that were successfully managed on site by their primary care physician because of patient and physician preference. Therefore, 549 of the 553 patients (99.3% [CI, 98.2% to 99.8%]) with a protocol recommendation for nontransport received appropriate care. Three additional residents had prompt follow-up visits with a primary care physician and had fractures that were diagnosed by outpatient radiography. Finally, 1 patient died 60 hours after the fall. This patient was seen by her primary care physician within 6 hours after the fall; she subsequently developed a gastrointestinal illness and started palliative care. Her death was not believed to be fall-related.

Outcomes of Patients Who Were Not Transported, Regardless of Protocol Recommendation

After 840 falls, 541 patients were not transported to an emergency department. Most patients were not transported because of the protocol recommendation, but some patients declined transport despite a recommendation. In addition, some patients recommended for nontransport requested and received transport. Of the 541 patients, 13 (2.4%) had a time-sensitive condition (NPV, 97.6% [CI, 95.9% to 98.7%]). Seven of the 13 nontransported patients with a time-sensitive condition had minor injuries that, because of patient and physician preference, were successfully managed on site. Therefore, at least 535 of the 541 nontransported patients (98.9% [CI, 97.6% to 99.6%]) received appropriate care.

Of the 541 patients who were not transported to an emergency department, 13 declined transport despite a protocol recommendation, which means that 528 transports (62.9% of the 840 falls) were avoided because of the protocol. The median time to primary care physician follow-up for nontransported patients was 10

hours (interquartile range, 2 to 14), and 95% of patients had follow-up in fewer than 18 hours. The single protocol violation involved a paramedic who did not transport a tier 2 patient and did not discuss the patient with the primary care physician. The patient did not have a time-sensitive condition.

DISCUSSION

To our knowledge, this study is the first prospective evaluation of a clinical decision tool designed to avoid unnecessary ambulance transport and emergency department visits for residents of assisted living facilities who experience simple falls. The tool combines paramedic assessment with primary care physician consultation and follow-up while respecting patient autonomy. Of the 953 residents in the study, 359 had 840 falls during 43 months. The protocol recommended nontransport after 553 falls. Eleven of these patients had a time-sensitive condition, but at least 7 of the 11 received appropriate care. As a result, at least 549 of the 553 patients (99.3% [CI, 98.2% to 99.8%]) with a protocol recommendation for nontransport received appropriate care. Results were similar when we analyzed the data according to actual transport, regardless of protocol recommendation.

The National Association of EMS Physicians asserts that emergency medical services may avoid unnecessary emergency department visits by determining which patients can be safely managed without transport, yet the literature suggests variability in paramedics' ability to make this determination (9, 10). Previous observational studies have described the characteristics of transport decisions by emergency medical services personnel for patients who had simple falls (11–14), and 1 qualitative study from the United Kingdom described the complexity of those decisions (15). However, the literature includes few objective, patient-centered evaluations of protocols for managing falls. As a result, emergency medical services care for assisted living facilities residents who fall has been largely restricted to stabilization followed by transport to an emergency department. A more progressive goal would be for paramedics to assess and triage patients to care that is appropriate to their condition and preferences. Ideally, this approach would result in better care at lower cost and greater patient and caregiver satisfaction, which is the Institute for Healthcare Improvement's "triple aim" (16). We believe our collaborative program between paramedics and primary care physicians is 1 step toward this goal, which is shared by other programs (17).

Our program began with thoughtful discussions about patient care and disposition that involved paramedics in the Advanced Practice Paramedics program and physicians from Doctors Making Housecalls. The paramedics and physicians worked closely: Paramedics contacted the primary care physician for 82% of tier 3 patients, even though consultation with a primary care physician was not required. We believe that another important part of our program was its commitment to timely follow-up with a primary care physician, because this ensured recognition of clinically important conditions. Still another important aspect was the role of the paramedics as liaisons among patients, families, and primary care physicians.

Our protocol identified 11 patients with time-sensitive conditions as being appropriate for nontransport. Paramedics discussed 9 of these cases with the on-call physician, who contributed to the nontransport decision. Four of the 11 patients were transported de-

Table 2. Outcomes Stratified by Protocol Recommendation and Actual Transport

Outcome	Fall Encounters (n = 840)	Protocol Recommendation		Actual Transport	
		Transport (n = 287)	No Transport (n = 553)	Yes (n = 299)	No (n = 541)
Time-sensitive conditions, *n (%)**	149 (17.7)	138 (48.1)	11 (2.0)	136 (45.5)	13 (2.4)
Catheterization laboratory	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Operating room	7 (0.8)	5 (1.7)	2 (0.4)	6 (2.0)	1 (0.2)
ICU admission	5 (0.6)	5 (1.7)	0 (0)	5 (1.7)	0 (0)
72-h mortality	3 (0.4)	2 (0.7)	1 (0.2)	2 (0.7)	1 (0.2)
Wound repair	70 (8.3)	69 (24.0)	1 (0.2)	67 (22.4)	3 (0.6)
Fracture	79 (9.4)	70 (24.4)	9 (1.6)	70 (23.4)	9 (1.7)
Successfully managed onsite†	7 (0.8)	4 (1.4)	3 (0.5)	NA	7 (1.3)
Other outcomes					
Hospitalized, *n (%)*	76 (9.0)	72 (25.1)	4 (0.7)	72 (24.1)	4 (0.7)‡
Median hospital stay (IQR), *d*	4 (3–6)	4 (3–6)	3 (2–5)	4 (3–6)	4 (2–7)
Median follow-up interval (IQR), *h*§	10 (2–15)	6 (1–14)	10 (2–15)	NA	10 (2–15)
Follow-up delay >18 h, *n (%)*‖	25 (3.0)	0 (0)	25 (4.5)	NA	25 (4.6)

ICU = intensive care unit; IQR = interquartile range; NA = not applicable.
* Patients may have met criteria for >1 outcome component.
† Defined as fracture or wound repair with follow-up within 18 h that did not require a subsequent emergency department visit.
‡ Only 1 nontransported patient subsequently hospitalized was not otherwise classified as having a time-sensitive condition.
§ Missing for 10 nontransported falls (including 2 patients who missed their follow-up appointment because they had other appointments and 1 who declined follow-up).
‖ Missing for 3 patients (excluding those who missed or declined their follow-up appointment).

Table 3. Patients Who Had Time-Sensitive Conditions But Were Identified by the Protocol for Nontransport

Time-Sensitive Condition	Actual Transport	PCP Contact	Time to PCP Follow-up, *h*	Protocol Tier	Comment
Patients who requested and received transport despite the protocol recommendation					
1. Fracture—femoral neck	Yes	Yes	NA	2 (obvious injury)	EMS noted "right hip pain" but did not document as meeting tier 1 criteria. After consultation with PCP, the advanced practice paramedic listed "family request" as reason for transport. Patient found to have a femoral neck fracture that was operatively repaired on hospital day 1.
2. Fracture—T10 compression	Yes	Yes	NA	2 (acute pain)	After consultation with PCP, the advanced practice paramedic listed "patient request" as reason for transport. Fracture diagnosed at the ED. Patient admitted for UTI and back pain; medically managed.
3. Fracture—wrist	Yes	Yes	NA	2 (obvious injury)	After consultation with PCP, the advanced practice paramedic listed "patient request" as reason for transport. EMS splinted the wrist because of suspicion of fracture. Fracture diagnosed at ED; patient discharged with outpatient orthopedic follow-up. Patient placed in a cast; managed nonoperatively.
4. Fracture—nasal bone	Yes	No	NA	2 (obvious injury)	Patient spoke to PCP on the telephone during the EMS call, but advanced practice paramedic discussion with PCP was not documented. Advanced practice paramedic listed "patient request" as reason for transport. Fracture diagnosed at ED. Discharged from ED back to facility; no management necessary for fracture.
Patients with minor injuries who were successfully managed onsite					
5. Fracture—humerus	No	Yes	18	2 (acute pain)	After consultation with PCP, patient remained at ALF. Patient reported shoulder pain at follow-up. Outpatient radiography identified humerus fracture. Seen by orthopedics as an outpatient; sling for treatment.
6. Fracture—acromion, nondisplaced	No	Yes	12	2 (mental status prevents examination)	After consultation with PCP, patient remained at ALF. Patient reported shoulder pain at PCP follow-up. Outpatient radiography revealed fracture; managed outpatient with sling.
7. Laceration—repaired with suture	No	No	1	3 (simple contusion)	PCP known to be in facility and immediately available for follow-up. PCP found laceration; repaired in ALF.
Other patients					
8. Fracture—femoral	No	Yes	2	2 (mental status prevents examination)	After consultation with PCP, patient stayed at ALF for follow-up for a couple of hours after fall. Unable to bear weight at follow-up. Immediate outpatient radiography identified fracture. Patient admitted for operative care.
9. Fracture—greater trochanter	No	Yes	1	3 (no complaint)	After consultation with PCP, patient with multiple recent falls, bilateral hip replacements, and gait instability remained at ALF for prompt PCP follow-up. Nondisplaced greater trochanter fracture found on outpatient radiography. Patient admitted for physical therapy/nonoperative care.
10. Fracture—fifth metacarpal	No	Yes	17	3 (simple contusion)	After consultation with PCP, patient's family preferred outpatient follow-up. Outpatient radiography diagnosed fifth metacarpal fracture. Patient sent to ED for splinting and subsequently admitted because of UTI and severe dementia. Family did not want admission, but ALF would not take patient back.
11. Death within 72 h	No	Yes	6	3 (simple contusion)	After consultation with PCP, patient seen by PCP at ALF shortly after fall. Subsequently developed GI syndrome (vomiting and diarrhea). Started palliative care. Died approximately 60 h after fall because of dehydration. No medical examiner involvement.

ALF = assisted living facility; ED = emergency department; EMS = emergency medical services; GI = gastrointestinal; NA = not applicable; PCP = primary care provider; UTI = urinary tract infection.

spite the recommendation, including 1 case where the patient (not the paramedic) spoke with the physician directly. In the only case without any physician contact, the physician was known to be on rounds in-house and available for immediate follow-up. Although a strict interpretation of our primary outcome requires classification of these cases as "misses," their clinical importance and need for transport are questionable.

We did not evaluate how many of the patients who were recommended for or received transport actually required emergency department care. Our focus was on developing a sensitive assessment tool and protocol with a good safety profile for nontransported patients, but only 138 of the 287 falls (48.1%) with a recommendation for transport were associated with a time-sensitive condition. Further research is needed to determine whether the protocol can be modified to reduce these transports without substantial sacrifices of safety.

Patients with simple, uncomplicated falls incur significant costs during emergency department evaluations. For example, the 80 patients with tier 2 findings who were subsequently transported to the emergency department generated at least 101 laboratory tests, 105 radiographs, and 80 computed tomography scans. Using Medicare payments (18) as a proxy for the costs of these assessments, we estimated that each patient transported for a simple fall resulted in approximately $1000 in costs, which does not include emergency department physician services, facilities, hospital observation stays, hospital admissions, or ambulance transport. A formal cost–benefit analysis of our protocol would also have to consider the additional expenses associated with the Advanced Practice Paramedic program and physician consultation and follow-up.

Our study has potential limitations. One is selection bias due to the use of Medical Priority Dispatch System card 17 to identify patients who had fallen, because the emergency medical dispatcher excluded other potentially serious medical conditions, such as stroke, breathing problems, and severe hemorrhage, before patients became eligible for our study. This selection may explain the lower-than-expected prevalence of time-sensitive conditions. Nonetheless, the characteristics of our study patients were similar to those in other studies reporting outcomes of falls in elderly persons (19–22), and our purpose was to evaluate the protocol for elderly residents of assisted living facilities with simple, uncomplicated falls. In addition, we considered each fall as an independent event, although approximately half of the patients who fell did so more than once. Limiting the analysis to the first event for each patient, however, did not meaningfully change the results (data not shown). We also saw no association between protocol recommendation, actual transport, or occurrence of time-sensitive conditions and duration of enrollment in the study, number of repeated falls, or events occurring early versus later in the study (data not shown).

We did not include hospital admission (outside of the intensive care unit, operating room, or cardiac catheterization laboratory) in our composite outcome of time-sensitive conditions because elderly patients are frequently hospitalized for logistic and social reasons unrelated to a need for emergency care (23). A post hoc analysis incorporating hospital admission as a time-sensitive condition did not meaningfully change our results: Only 1 of the 553 patients for whom the protocol recommended nontransport (and 1 of 541 actual nontransported patients) was hospitalized without a time-sensitive condition.

Most communities do not have resources similar to Doctors Making Housecalls and the Advanced Practice Paramedic program. These progressive services were critical for ensuring rapid follow-up and facilitating rapport among the patients, primary care physicians, and emergency medical services providers necessary for this project. Absence of such services could limit the generalizability of our findings because other locations may be unable to implement similar protocols and because residents of assisted living facilities may be unwilling to participate without them. Also, current reimbursement models for emergency medical services pay only for transport, not assessment, which creates a perverse disincentive against programs like ours (24, 25). However, we propose our results as a "proof of concept" that might stimulate other locales to develop these resources. We believe that if our findings can be replicated in other communities, thousands of residents in assisted living facilities who have simple falls each year could potentially be triaged away from the emergency department to more appropriate onsite assessment and follow-up by physicians. This development would be consistent with a key goal of modern health care, which is getting "the right resource to the right patient at the right place at the right time" (26, 27).

Our study evaluated a protocol that couples paramedic assessment with primary care physician consultation and timely follow-up to reduce unnecessary ambulance transport for elderly residents of assisted living facilities. Implementation of this protocol in our cohort resulted in a substantial decrease (62.9%) in transports, with 98% to 99% of nontransported patients receiving safe, appropriate care. If successfully implemented on a widespread basis, this approach could potentially avoid large numbers of unnecessary ambulance transports to the emergency department for simple falls.

From Wake County Emergency Medical Services, Raleigh, and University of North Carolina at Chapel Hill, Chapel Hill, North Carolina; Wake County Emergency Medical Services, Raleigh, North Carolina; Dell Medical School at The University of Texas at Austin, Austin, Texas, and Mount Isa Centre for Rural and Remote Health, James Cook University, Townsville, Queensland, Australia; Brody School of Medicine at East Carolina University, Greenville, North Carolina; and Doctors Making Housecalls, Durham, North Carolina.

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Disclaimer: Dr. Williams takes responsibility for the study as a whole. The authors alone are responsible for the content and writing of the paper.

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Reproducible Research Statement: *Study protocol:* See Supplement (available Annals.org). *Statistical code and data set:* Available through written agreements with the authors; contact the primary author with inquiries (e-mail, jeff.williams@wakegov.com).

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