Geriatric Nursing 39 (2018) 574–579

Contents lists available at ScienceDirect

Geriatric Nursing

journal homepage: www.gnjournal.com

Feature Article

Outcomes and provider perspectives on geriatric care by a nurse practitioner-led community paramedicine program

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ARTICLE INFO

Article history:
Received 12 January 2018
Received in revised form 27 March 2018
Accepted 2 April 2018
Available online 3 May 2018

Keywords:
Community paramedicine
Nurse practitioner
Geriatric care
Home care

ABSTRACT

This study explores the use of a nurse practitioner-led paramedicine program for acute, home-based care of geriatric patients. This case series describes patients, outcomes, and geriatric primary care provider perspectives related to use of this independent paramedicine program. There were 40 patient visits from August 2016–May 2017. We reviewed patient demographics, medical conditions, healthcare utilization, and communication processes and used semi-structured interviews and content analysis to explore staff perspectives. The most commonly treated diagnoses were respiratory conditions, urinary tract infections, and gastrointestinal concerns. Two patients required an immediate transfer to a higher level of care. Six patients had emergency department visits and five patients were hospitalized within two weeks. Geriatric providers identified three themes including: potential benefits to geriatric patients, importance of enhanced care coordination and communication, and considerations for the specific role of nurse practitioner-led community paramedicine programs for geriatric patient care.

Published by Elsevier Inc.

Introduction

Older individuals tend to have more functional limitations and hospitalizations.[1] Adults over the age of 75 have the highest rate of emergency department (ED)[1] utilization after infants less than 1 year of age,[2] and are more likely to be hospitalized than younger individuals.[3] ED visits and hospitalizations can be harmful for older adult populations due to increased rates of delirium, infections, and impaired functional status as a result of being hospitalized.[4] These challenges can prevent patients from returning to their prior level of functioning.[5] In some cases, ED visits and hospitalizations of older adults might be avoidable if patients received home-based care. Potentially avoidable ED visits and hospitalizations may be physically, emotionally and financially costly for patients and caregivers.

Newer models of community paramedicine may decrease ED utilization and hospitalizations by older adults. Community paramedicine is described as a "healthcare delivery model that increases access to basic services through the use of specially trained emergency medical service (EMS) providers in an expanded role".[6] Originally designed to address rural health care needs, these models have expanded to over 260 programs across the country and often focus on reducing patient transport and hospital admissions.[7,8] For example, the Area Metropolitan Ambulance Authority or MedStar focuses on patient populations in Fort Worth, TX who are at high risk for potentially preventable hospital admissions.[9] Since 2009, MedStar claims it has prevented 1917 ED visits and 462 hospitalizations.[10] Northwell Health's community paramedicine program focuses on geriatric patients (average age 83); preliminary results demonstrated that 78% of patients utilizing this program were adequately treated at home. For patients who required an ED

Conflict of Interests: The authors have no conflicts of interest to disclose.

Author's Contributions: We appreciate the clinical excellence of the UCHealth Seniors Clinic – Anschutz Medical Campus staff who assisted with implementation and conduct of this quality improvement project. We also appreciate help from Joanna Dukes, MS, related to data collection. The authors' role in study concept and design (all), acquisition of subjects and/or data (RK), analysis and interpretation of data (RK, HL), and preparation of manuscript (all).

Funding: This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. Dr. Lum was supported in part by the National Institute On Aging of the National Institutes of Health under Award Number K76AG054782. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health or the Department of Veterans Affairs.

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0197-4572/$ — see front matter Published by Elsevier Inc.
https://doi.org/10.1016/j.gerinurse.2018.04.003

visit, 82% were admitted to the hospital, suggesting that individuals were appropriately triaged to a higher level of care.[11] Of patients and caregivers who responded to a follow-up survey, 91% reported they would have sought care in the ED if the Northwell Health program was not available.[11] Some paramedicine programs employ nurses (18%), nurse practitioners (9%) and physician assistants (3%), although most programs are staffed by paramedics (77%) and emergency medical technicians (EMTs) (26%).[8]

Despite its growth, there are unanswered questions regarding the role and use of community paramedicine programs for frail older adults. One concern is patient safety within paramedic-driven systems and potential rates of under-triage by emergency personnel.[12] The ability of EMTs trained in emergency medicine to provide care for chronically-ill geriatric patients remains unclear. Integrating communication between community paramedicine programs and geriatric care providers is another challenge.[13] One study highlighted challenges, especially given varying roles these programs may have in patient care.[14] Specifically, they identified skepticism on the part of physicians, a nurse practitioner, and social worker about the potential benefits of the use of paramedics in the community. New models that ensure quality geriatric care while facilitating communication and care coordination with primary care are needed, including models that are led by nurse practitioners.

This report describes an independent evaluation of the use of a community paramedicine program when the service provider was used by geriatric primary care patients. DispatchHealth™ is an advanced practice provider-led free-standing community paramedicine service provider that provides home-based episodic care. Together with EMTs, the company dispatches a nurse practitioner or physician assistant to the homes of patients with acute medical needs. An ED physician provides on-call to support if needed for consultation. Compared to community paramedicine programs staffed only by paramedics or EMTs, use of nurse practitioners enables enhanced assessment and treatment in the context of multiple medical conditions, and ability to provide clinical services as a home visit with the average cost ranging from $150 - $300 depending on a patient's insurance plan (compared to the median ED visit cost of over $1200).[15,16] Medical care can include lab work, basic imaging, medications (including parenteral), intravenous fluids, and minor procedures such as laceration repair and Foley management. DispatchHealth can bill Medicare, Medicaid, Tricare and several private health plans. Past users of DispatchHealth claim that the service was simple to use because it took place in their own home, saved them time and money, and minimized the stress of going to an ED.[15] If necessary, the team can facilitate transfer to a higher level of care.

Given the involvement of this community paramedicine program in the care of geriatric primary care patients, the objectives of this evaluation are to understand the use and potential impact of the program on patient care, including understanding provider perspectives on patient safety, communication, and care coordination. First, we described patient characteristics, conditions treated, and healthcare utilization of older adults using DispatchHealth. Then, we explored geriatric team member perspectives on program use to understand opportunities for improving care for older adults. To the best of our knowledge, no other studies have examined the perspectives of providers on older adult patients who use paramedicine programs. Primary care providers are important stakeholders related to the potential impact of paramedicine programs on the overall care of patients. Because DispatchHealth is a program already available to patients and families, this study aimed to understand the use of the program by geriatric patients and perspectives of providers in terms of potential benefits, harms, or specific areas for improvement related to geriatric care.

Methods

Study design

This case series uses multiple methods to gain insight into use of DispatchHealth services related to care of older adults in a geriatric primary care clinic through collecting and analyzing quantitative data by chart review and qualitative data from geriatric team member interviews. This clinical demonstration project was reviewed and approved by the Colorado Multiple Institutional Review Board as Not Human Subject research. All individuals that were approached to participate in the evaluation interviews verbally acknowledged understanding that their participation was voluntary and that any potentially identifying information would not be shared.

Model description

The UCHealth Seniors Clinic is an academic geriatric clinic that provides outpatient primary care. The clinic does not have capabilities to see patients in the home setting for acute medical needs. Therefore, a patient with an acute medical need could be seen by DispatchHealth based on patient preference, lack of same-day clinic availability or transportation to the clinic, need for a visit outside of routine clinic hours (nights/weekends), or when, per a clinic nurse triage system, the geriatric care team prefers home-based rather than ED-based care. Patients, family members or caregivers, and home care providers can also call DispatchHealth directly. After receiving the chief complaint and basic history, a nurse practitioner or physician assistant and EMT are sent to the home where they assess and treat the patient. Patients are typically seen by DispatchHealth within 28 minutes of the initial call and provide in-home care for an average of 49 minutes.[17] Lab and imaging results, along with provider visit documentation, are faxed to the primary care provider at the clinic, if identified by the patient. The goal of UCHealth Seniors Clinic in referring patients to DispatchHealth is to provide geriatric patients the opportunity to receive urgent care in their own homes and to prevent the unnecessary burdens and costs of potentially avoidable ED visits and/or hospitalizations.

Participants

This case series focuses on UCHealth Seniors Clinic patients who used DispatchHealth between August, 2016 and May, 2017. When the primary care team learned that a patient used DispatchHealth, their information was logged by a clinic nurse to enable chart review. To understand the perspectives of multidisciplinary geriatric team members, a convenience sample was used to identify ten UCHealth Seniors Clinic team members, including nurse practitioners, physicians, nurses, and social workers who participated in semi-structured interviews to provide feedback on the DispatchHealth process. All interviewees had direct clinical experience with at least one patient who had used the program. We selected different team members to gain unique perspectives and enable triangulation across multiple disciplines. The team members were representative of the UCHealth Seniors Clinic team. Interviews continued until no new themes were identified.

Data collection

To describe use of DispatchHealth, we performed a chart review focusing on patient characteristics, medical comorbidities and healthcare utilization. Patient medical comorbidities were obtained from the Problem List in the medical record. We reviewed encounter notes both in the patient's medical records and using the Colorado Regional

Health Information Organization database (a statewide health information exchange) to identify the number of ED visits and hospitalizations that occurred within two weeks after DispatchHealth use (including same day use). Documents from the paramedicine program, when available, were reviewed to identify medical conditions treated. We also assessed when documents were received by the clinic in relation to the DispatchHealth encounter and the average number of days between program use and a follow-up visit with the clinic.

To understand potential benefits, harms, and challenges related to use of DispatchHealth, semi-structured interviews were conducted by RK (resident physician) with ten geriatric primary care team members. All interviewees were asked four open-ended questions, and probed to obtain detailed perspectives and examples. The questions were designed to explore geriatric team members' perspectives on DispatchHealth. Interviews were audio recorded and transcribed.

Data analysis

Quantitative data analysis included descriptive statistics assessing frequencies, percentages, and means. A qualitative content analysis was led by two authors (RK [resident physician] and HL [geriatrician]), using an inductive process.[18] Twenty pages of single spaced text were read carefully by RK and 14 codes were defined based on important statements from the text. RK and HL met to discuss and agree on descriptions of each code. Then, RK and HL independently coded the interview text, met to confirm similarity in coding, and reached consensus through discussion where needed. After coding was completed, RK and HL met to discuss patterns or groupings of the codes into meaningful themes.[19] We maintained an audit trail and worked to clarify author biases to enhance data accuracy. RK and HL presented multiple iterations of themes with quotations to the interdisciplinary authorship team who together identified the most representative quotations. All authors reflected on their own clinical experiences with and/or perceptions of DispatchHealth to further identify biases that could affect interpretation of the results. No authors or any members of the clinic have financial interests or a formal clinical partnership with the company. Given the specific characteristics of clinical practice, results are not generalizable.

Results

Patients and conditions treated by a community paramedicine program

Over 10 months, 35 older adults used DispatchHealth at least once during the evaluation period with five patients having two unique visits. A total of 40 patient visits were analyzed. Mean patient age was 87.8 years (at the time of visit), 85% were women, and 95% had six or more medical comorbidities. The most common medical conditions treated by DispatchHealth were respiratory conditions (30%), urinary tract infections (18%), and gastrointestinal concerns (15%). Patient characteristics and medical conditions treated are shown in Table 1.

Healthcare utilization and communication processes

Across all 40 DispatchHealth visits, two patients (5%) required immediate transfer to a higher level of care upon assessment (one went to the ED and was discharged; one was hospitalized). In total, six patients (15%) had ED visits and five patients (13%) were hospitalized within two weeks of DispatchHealth use, including the two patients who were immediately transferred to a higher level of care. We specifically examined healthcare use by the very old, ages 90 and above. Of 14 patients who were ages 90 and above, only one had an ED visit within two weeks following the paramedicine visit (see Fig. 1).

Table 1
Patient characteristics, medical conditions treated and outcomes.

Characteristics at the time of Community Paramedicine Program Visit (n = 40 visits)	N (%)
Gender	
Female	34 (85)
Age, Mean Years	87.8 ± 6.2
70–79	4 (10)
80–89	22 (55)
90–99	14 (35)
Living Situation	
Assisted Living	10 (25)
Independent Senior Living	2 (5)
House/Apartment	28 (70)
Number of Co-morbidities	
> 6	38 (95)
Medical Conditions Treated	
Respiratory Conditions	12 (30)
Urinary Tract Infections	7 (18)
Gastrointestinal Concerns	6 (15)
Neurological Complaints	5 (13)
Head and Neck Conditions	3 (7.5)
Musculoskeletal Concerns	3 (7.5)
Fever	1 (2.5)
Hypertension	1 (2.5)
Bruising	1 (2.5)
Lacerations	1 (2.5)
Outcomes Following DispatchHealth Visits	
Treated at Home	38 (95)
Sent to the ED Same Day as Visit	1 (2.5)
Hospitalized Same Day as Visit	1 (2.5)
Outcomes within Two Weeks of Visit	
ED Visit Within Two Weeks of Visit[a]	6 (15)
Hospitalization Within Two Weeks of Visit[b]	5 (12.5)
Amount of Time for DispatchHealth Documents to be Available to Clinic	
< 2 weeks	30 (75)
2 weeks +	3 (7.5)
Never	7 (17.5)
Follow-Up Visits with Clinic	
Average Number of Days Between DispatchHealth Visit and Follow-Up Visit with Clinic	18 ± 19

[a] Includes patient with ED visit same day as DispatchHealth visit.
[b] Includes patient hospitalized same day as DispatchHealth visit.

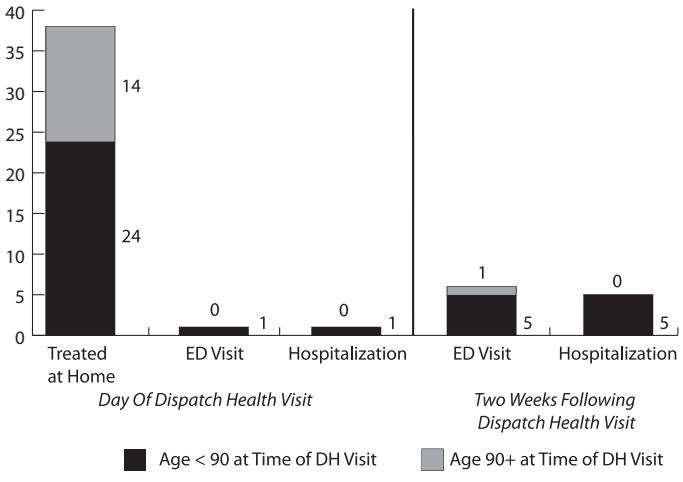

Fig. 1. ED and Hospitalizations Day Of and Two Weeks Post Dispatch Health Visit.

We reviewed any DispatchHealth documents received and scanned into the medical record to determine timing of receipt of records in relation to the visit. Of the 40 DispatchHealth visits, notes regarding the visits were scanned into the patients' medical records within two weeks of DispatchHealth use for 75% of the visits. Three visits (7.5%) had notes scanned in more than two weeks following DispatchHealth use and seven visits (18%) never had notes scanned into the medical record. Of the 40 DispatchHealth visits, 35 of them were followed by a clinic visit within an average of 18 days±19.

Geriatric team member perspectives

We identified three themes and sub-themes related to geriatric primary care team members' perspectives on the role and use of DispatchHealth for older patients: 1) potential benefits to geriatric patients; 2) importance of enhanced care coordination and communication; and 3) the uncertain role of a community paramedicine program as part of geriatric primary care. Table 2 includes representative quotes to highlight team members' perspectives.

Potential benefits to geriatric patients

The most prominent theme that emerged across all interviews was that DispatchHealth has the potential to benefit geriatric patients. These benefits were related to three sub-themes: 1) access to care, 2) decreased ED visits/hospitalizations, and 3) advantages to specific patients and caregivers. Multiple providers noted the significance of this service in allowing patients greater access to clinical assessment and management, especially when clinic options were limited. They related the need for access during scheduling unavailability and nights/weekends when the clinic was closed. Several providers expressed the value of having an in-person assessment at home because of challenges related to triage of geriatric acute care issues over the phone. They also noted instances of older patients waiting too long to be seen due to reluctance to go to the ED and fear of burdening caregivers who provide transportation.

The second sub-theme was the potential benefit of appropriate triaging to decrease ED visits and unnecessary hospitalizations. Interviewees discussed a desire to avoid adverse events such as hospital-acquired infections, delirium, and debilitation for older adults. They cited unnecessary exposure in the ED and inappropriate hospitalizations for conditions that may not require that level of care. They expressed concerns for patients with underlying dementia or cognitive impairment related to ED visits and hospitalizations.

The third sub-theme discussed advantages of a community paramedicine program to specific patients and caregivers. Interviewees noted that particular sub-sets of patients who are especially frail, have limited mobility, are homebound, or lack transportation may benefit the most from DispatchHealth. They also discussed the reassurance that such a service can provide to caregivers. Participants noted the relief caregivers can experience knowing that loved ones are taken care of when they themselves may not be able to be there.

Importance of enhanced care coordination and communication

The second key theme related to care coordination and communication between DispatchHealth and the geriatric primary care clinic. This included three sub-themes: 1) importance of clinic facilitation, 2) insight into patients' home and social situations, and 3) limitations in communication.

Interviewees noted that documentation from DispatchHealth was initially slow when the program first began seeing patients. However, as coordination with the clinic was adjusted, communication processes improved. Some discussed receiving faxed documentation of the visit as early as two days from the date of service. To facilitate this communication, patients were often instructed by clinic staff to inform DispatchHealth of who their primary provider was.

Table 2
Geriatric primary care team perspectives on a community paramedicine program.

Themes	Exemplar Quotes
Theme 1. Potential Benefits to Geriatric Patients	
1.1 Access to Care	"I look at it as a type of access. When someone should be seen today or tomorrow and we're not able to get them in, the options are urgent care or ER, or wait, and this is another option."
1.2 Decreased ED Visits/Hospitalizations	"It doesn't always avert a hospitalization, but if you can, that's a really great thing because a lot of times these people will go to the ED and maybe they do need some urgent care, but they don't need to be hospitalized and they get hospitalized anyway."
1.3 Advantages to Specific Patients and Caregivers	"Transportation is a major barrier, especially for my homebound patients, so if they need something addressed, I give them that [DispatchHealth] option too."
Theme 2. Importance of Enhanced Care Coordination and Communication	
2.1 Importance of Clinic Facilitation	"I encourage our patients and family member to identify their Primary Care Provider (PCP) as well as our clinic at time of their DispatchHealth visit. This facilitates DispatchHealth getting the visit summary back to us."
2.2 Insight into Home and Social Situations	"I liked the notes that I got- they really alerted me to a few things that were going on that were even above and beyond the reason for the visit, some social issues, other health problems."
2.3 Limitations in Communication	"When the report came in, they had the chest x-ray results that showed a new lung mass. And no one called us about that. So… it would have been great to have gotten a phone call alerting us to that, because that's one of those things where you could have done a quick scan and not necessarily looked at those results in detail and missed it."
Theme 3. Uncertain Role of Community Paramedicine Program in Geriatric Primary Care	
3.1 Role providing appropriate geriatric-focused care	"Urgent care, ED services, tend to over-treat or land people in the hospital and I feel like DispatchHealth, for some reason has a little more of a geriatric spin to it. Or just, their goal is to keep people at home just like ours is."
3.2 Role integrating with primary care	"Due to the complex nature of so many of our patients, I prefer to keep their care in our clinic. Our multidisciplinary team communicates with each other, which results in safer, patient-centered care. Having said that, the support of DispatchHealth for urgent issues is invaluable."
3.3 Role in on-call situations	"I think it also helps on the weekend when you don't have access to an urgent care and you don't want them to go to the ED, but want to lay some eyes and ears on them."

This workflow was developed to increase visit documentation being sent to the correct clinic. Many interviewees expressed concern that the main reason the clinic received documentation was because the clinic staff requested it.

Some providers discussed how DispatchHealth visit notes gave them deeper insight into their patients' home and social situations and thus, had advantages compared to a clinic visit. They stressed the importance of this to geriatrics, where home environments often directly affect patient care. Despite these advantages, providers also noted limitations in communication. Multiple interviewees reported getting documentation later than they would have liked. Several also noted that documentation was only sent if DispatchHealth was aware of who the primary care provider was. Interviewees specifically described this as a challenge if patients, home care providers or residential facilities called DispatchHealth on their own versus contacting the clinic first. In several instances, providers reported wishing that they had been contacted quicker regarding acute issues noted during the DispatchHealth encounters.

Uncertain role of community paramedicine program in geriatric primary care

The third key theme was the uncertain role of DispatchHealth as part of the clinic's care for older patients. There were three subthemes identified: 1) role in providing geriatric-focused care, 2) role in integrating with primary care, and 3) role in on-call situations. As DispatchHealth provides acute care to patients of all ages, providers expressed concerns regarding their ability to provide appropriate geriatric-focused care. However, the majority felt that care of their older patients was as-good to better than ED-based care. Several providers felt these models may have a "geriatric spin", as their goal of managing patients' acute needs at home, if medically appropriate, aligns with best geriatric care. However, some interviewees raised concerns about inappropriate prescribing of antibiotics which could lead to increased susceptibility and risk of resistant infections in this already-fragile geriatric population. Others worried about the ability of advanced practice providers trained in emergency medicine to differentiate illness acuity in chronically-ill patients with dementia or management of geriatric syndromes.

The second subtheme examined the role of integration with geriatric primary care. One topic of discussion was whether information regarding this service should be given to patients in advance or routinely as an option for the future, or if it should only be offered on an individual basis as acute needs arise. While a few interviewees felt that all patients should be given information on DispatchHealth ahead of time, the majority of staff were hesitant about this. Many felt that the convenience of DispatchHealth would prevent patients from calling the clinic first with their acute needs. Most providers and staff felt that the first and best option would be for the patient to be seen by their primary care provider if possible. Only after this option was exhausted or unavailable should DispatchHealth be considered. Participants also reported apprehension regarding over-utilization of DispatchHealth by patients who are not satisfied with decisions by primary care providers. Others questioned whether patients may attempt to use this system for management of chronic conditions.

The third subtheme relates to the role of DispatchHealth in on-call situations. Providers noted that in these instances, patients are unable to utilize the clinic as their first option, so it was more likely that they would be referred to DispatchHealth. In these situations, geriatric providers can give a "warm handoff" to the DispatchHealth provider that leads to an in-person assessment of the patient at home. This gives providers another option rather than sending a patient to the ED in these on-call situations when it can be difficult to triage over the phone.

Discussion

The majority of patients from our academic geriatric clinic seen by a nurse practitioner-led community paramedicine team were appropriately treated and did not require higher levels of care. Among patients ages 90 and older, no patients required transport to a higher level of care on the same day as the DispatchHealth visit. Our findings demonstrate the feasibility of these systems to decrease unnecessary ED visits/hospitalizations and improve access to care.[7,10] Additionally, we identified multidisciplinary geriatric team members' perspectives related to specific benefits to geriatric patients, communication processes and care coordination between community paramedicine programs and primary care providers, and the specific role this model may have in geriatric care.

Geriatric team members described potential benefits to older adult patients, especially patients with mobility or transportation limitations. Community paramedicine programs offer a way for older individuals to be seen quickly and may prevent hospitalizations due to lack of access to medical care. This model may also assist caregivers. Next steps should focus on exploring older adult and caregiver perspectives on potential benefits and challenges of community paramedicine programs, and formally comparing this model to traditional urgent care or ED options in a clinical research study.

We also described need for better communication and integration of community paramedicine programs into geriatric care. Communication and continuity of care was improved when the call to DispatchHealth was initiated from the clinic instead of patients or others. Documentation was more frequently received by the clinic when patients identified their primary care provider. Without timely and complete documentation shared with the clinic, providers have limited ability to act on any pertinent acute care needs of patients or any potentially new diagnoses requiring close primary care follow up. While facilitation of DispatchHealth use by the clinic may help to improve communication, further study and new systems, including integrated electronic health records, are needed to effectively communicate acute issues between community paramedicine and primary care teams.

Importantly, our findings also identified the uncertain role a community paramedicine program may have in the care of geriatric patients, from the perspectives of geriatric providers. This model of care may be most beneficial when used in the on-call setting. Interviewees described concerns that emergency-trained providers may not have sufficient training to appropriately care for chronically-ill geriatric patients and geriatric syndromes. This concern is especially relevant for frail older patients who are often more tenuous than the general population. Thus, an implication of this study is the importance for paramedicine programs to evaluate their patient populations to determine their overall case-mix. If programs are primarily serving an older population, our findings suggest the need for geriatric training. Paramedicine programs could consider developing common educational activities and partnerships with the primary care or residential care facility staff of the older adult populations.

DispatchHealth is unique in that it utilizes a nurse practitioner or physician assistant and an EMT, which may enable better initial evaluation of the geriatric patient and the ability to differentiate sick from not-sick in a chronically-ill population. Future studies should focus on differences in quality of geriatric care within community paramedicine programs who employ a nurse practitioner versus those who do not, specifically focusing on geriatric-specific concerns (e.g. over-treatment of infections/inappropriate use of antibiotics, delirium and cognitive impairment, and chronic disease

exacerbations). Similarly, there is the potential opportunity for geriatric nurse practitioners to be an excellent provider for community paramedicine programs in the care of frail older patients.

This report has several limitations. First, the sample size is small and not generalizable, with only 35 patients who had 40 DispatchHealth visits and ten team members from one geriatric clinic who were interviewed. Second, we were not able to compare the 35 individuals who used DispatchHealth to other patients who were seen urgently in the clinic. Future studies should compare the reasons and patient differences for use of paramedicine services versus those who are seen in the clinic urgently. Third, we focused on feedback from the healthcare team. Future studies should include perspectives of patients, informal and formal community-based care providers, and the community paramedicine program providers.

In conclusion, this report provides new insights on the role of community paramedicine in geriatric primary care and can promote development of effective, patient-centered models that provide quality geriatric care while preventing unnecessary ED visits/hospitalizations. While these systems may offer considerable benefits for geriatric patients, effective integration and communication with geriatric primary care poses challenges. Whether a nurse practitioner-led community paramedicine program provides quality geriatric care warrants future study.

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