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Multimethod Process Evaluation of a Community Paramedic Delivered Care Transitions Intervention for Older ED Patients

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Abstract

Objective: We assessed fidelity of delivery and participant engagement in the implementation of a community paramedic coach-led Care Transitions Intervention (CTI) program adapted for use following emergency department (ED) visits.

Methods: The adapted CTI for ED-to-home transitions was implemented at three university-affiliated hospitals in two cities from 2016 to 2019. Participants were age 60 years old and discharged from the ED within 24 hours of arrival. In the current analysis, participants had to have received the CTI. Community paramedic coaches collected data on program delivery and participant characteristics at each transition contact via inventories and assessments. Participants provided commentary on the acceptability of the adapted CTI. Using a multimethod approach, the CTI implementation was assessed quantitatively for site- and coach-level differences. Qualitatively, barriers to implementation and participant satisfaction with the CTI were thematically analyzed.

Results: Of the 863 patient participants, 726 (84.1%) completed their home visits. Cancellations were usually patient-generated (94.9%). Most planned follow-up visits were successfully completed (94.6%). Content on the planning for red flags and post-discharge goal setting was discussed with high rates of fidelity overall (95% and greater), while content on outpatient follow-up was lower overall (75%). Differences in service delivery between the two sites existed for the in-person visit and the first phone follow-up, but the differences narrowed as the study progressed. Participants showed a 24.6% increase in patient activation (i.e., behavioral adoption) over the 30-day study period ($p<0.001$).

Overall, participants reported that the program was beneficial for managing their health, the quality of coaching was high, and that the program should continue. Not all participants felt that they needed the program. Community paramedic coaches reported barriers to CTI delivery due to patient medical problems and difficulties with phone visit coordination. Coaches also noted refusal to communicate or engage with the intervention as an implementation barrier.

Conclusions: Community paramedic coaches delivered the adapted CTI with high fidelity across geographically distant sites and successfully facilitated participant engagement, highlighting community paramedics as an effective resource for implementing such patient-centered interventions.

Keywords

Care Transitions; Emergency Department; Community Paramedicine; Older Adults

Introduction

There is increasing demand for home-based health services designed to address the needs of vulnerable, underserved, and hard-to-reach populations. However, insufficient numbers of trained health care workers are available in most communities to meet this demand (1, 2). These workforce limitations have driven innovative thinking on how to harness existing resources to address patient needs (1). Community paramedics are a potential resource to deliver community-based health and social services, particularly to high-risk individuals (1-6). Although studies have demonstrated the value of community paramedicine programs to positively affect patient health (2, 3, 7-10), none have evaluated the ability of community paramedics to deliver evidence-based care transitions programs with the fidelity required to achieve optimal outcomes. Specifically, it is important to know if community paramedics can deliver programs that improve the quality of transitions for older adults returning home following emergency department (ED) care.

We previously adapted the Care Transitions Intervention (CTI) (11-14) for use with older adults (aged 60 years) following ED care and conducted a randomized controlled trial to test its effectiveness when delivered by community paramedics between 2016-2019 (15-18). After completing extensive data cleaning, we have produced seven manuscripts detailing various results, including our primary finding that participants who received the CTI had increased outpatient follow-up and better recall on red-flag knowledge (17). Nonetheless, there is still a need to examine the CTI's effectiveness at facilitating patients' engagement in key health management behaviors (19-21) and evaluate how implementation-related factors

contributed to results (22-24) to ensure that when the program is applied elsewhere, similar results are achieved. This is especially important for multi-site trials like the CTI study, where variability due to context and delivery differences needs to be understood (23). Thus, this paper aims to evaluate the implementation of this community paramedic-delivered CTI program following ED care, focusing on two essential domains for effective implementation of complex behavior-change interventions: fidelity of delivery and participant engagement (25, 26).

Methods

Study Design

Setting—We analyzed the implementation of the adapted CTI for use in ED-to-home transitions among community-dwelling older adult patients ([clinicaltrials.gov: NCT02520661](https://clinicaltrials.gov/ct2/show/study/NCT02520661)) at three hospitals in two university-affiliated health systems in Madison, WI and Rochester, NY. The University of Wisconsin and University of Rochester Institutional Review Boards approved this study with written informed consent. Enrollment and data collection occurred between January 2016 and July 2019.

Participants—Each eligible participant for the single-blind randomized controlled trial was at least 60 years of age, resided in Dane County, WI or Monroe County, NY, had a primary care clinician affiliated with either health system, had a working telephone, and was discharged from the ED to a community residence within 24 hours of arrival. Each participant had to have decisional capacity or a legally authorized representative to provide consent. This analysis only included participants assigned to the intervention group. Patients were excluded if they did not speak English, had significant visual or hearing impairment after correction, did not have a permanent residence, were enrolled in hospice, a transitions program, or a care management program, presented with a primary behavioral or psychiatric problem, were assigned an Emergency Severity Index of 1, or had previously participated.

Approach—Full details regarding the parent study protocol, adapted CTI, and community paramedic coach training have been published (15-17). Briefly, research coordinators identified and consented eligible ED patients. Participants were randomized to the control (usual care) or intervention (CTI) group. Surveys were administered in the ED and via phone approximately 4 and 30 days after ED discharge. Legally authorized representatives could assist in completing certain measures. We also abstracted data from the medical record using best practices for chart review (27). Community paramedics used standardized forms to document intervention delivery and patient engagement.

Intervention—The ED-to-home CTI program consisted of a home visit and up to three phone calls delivered by one of eight community paramedic coaches, who were affiliated with local EMS agencies, trained and certified to conduct the CTI by intervention developers (15, 18). Prior to ED discharge, research coordinators scheduled each participant for a home visit within 24-72 hours of discharge and assigned to a community paramedic coach based upon availability. Completion of the home visit was necessary to continue participating in the CTI. At the end of the home visit, the coach scheduled a follow-up

phone call with each participant. The coach used well-established coaching communication strategies (e.g., motivational interviewing) to deliver information about and discuss targeted care transition behaviors, particularly the pillars of care transitions: timely outpatient follow-up, medication reconciliation and self-management, understanding “red flag” symptoms necessitating further care, and creation or review of a personal health record for use in health care visits (12, 14, 28). Coaches also worked with participants to identify health-related goals (29, 30) to further engage and activate them to improve their health following their ED visits. Up to two additional calls were scheduled based on participant need and progress related to targeted self-management behaviors and self-identified goals. During follow-up phone calls, coaches reinforced content and behaviors previously addressed and answered questions. Coaches did not interact with primary care providers but did train participants to effectively interact with their primary care providers (16).

Measures

Table 1 describes each process evaluation outcome measured, along with the data sources and analytic methods employed. Outcomes are categorized first into domains for evaluating the implementation of complex behavior change interventions: how well the intervention was delivered as intended (“fidelity of delivery”) and how it was received by program recipients (“participant engagement”) (25, 26, 31-33). These were then further organized into critical components of intervention fidelity, including coverage, content, dosage (i.e., level or quantity of intervention implemented), receipt, enactment, acceptability, and appropriateness (18, 24, 32, 34, 35).

Coach-completed Inventories—Community paramedic coaches collected quantitative and qualitative data on the delivery and content of each participant contact (Figure 1):

- **Quantitative: Delivered Services Inventory (DSI):** Coaches documented content covered in the session. For measurement purposes, each pillar was scored as the proportion of items delivered, with the numerator counting items either delivered at the visit, completed previously, or not applicable, and the denominator representing all possible items (including those not discussed). This ensured the proper handling of items completed previously, completed during the visit, not completed, or not applicable.
- **Quantitative: Patient Activation Assessment:** This standard CTI assessment tracks participant understanding of targeted care transition behaviors and reasons for engaging in them (36). Coaches evaluated participant knowledge of self-management activities across all areas of CTI content, monitoring progress at each visit. Binary ratings are given to each of the 10 items, creating a summative score ranging from 0 (lowest) to 10 (highest).
- **Qualitative: Community paramedic coach visit notes:** Each coach recorded details for attempted or completed participant interactions using standardized forms, including visit completion, time spent, visit content (free-text notes per CTI content area), progress made towards behavioral adoption and goal achievement, issues that arose during the session, and topics to be addressed in future visits. Notes also described reasons for canceling and/or rescheduling the

visit, barriers to visit completion (i.e., systemic, paramedic, or patient related), decisions regarding future interactions, and comments made by the participant, offered of their own volition during study activities, about the experience. To maximize the quality of data collected, the coaches were uniformly trained and certified to conduct the CTI, including documentation, by program instructors. Additionally, the importance of the free-text notes and other documentation was reinforced to the coaches by the study team members at group meetings.

Participant Perspectives—We measured the acceptability of the intervention quantitatively through a survey administered 30 days after ED discharge. Participants were asked by research coordinators how likely they would be to choose an ED offering this type of coaching program over one that did not, using a five-point scale. Any comments made by the participants of their own volition to the research coordinators during this time were also recorded and included for qualitative analyses.

Participant Characteristics—Consistent with the characteristics reported for intervention effectiveness (17), we included quantitative variables based on established relationships with care-seeking and transitions behaviors. Sociodemographic characteristics were collected from survey responses and medical record review. Health characteristics were obtained using validated instruments (Table 2). We categorized participants as having cognitive impairment if they had scores >10 on the Blessed Orientation Memory Concentration Test (37) administered at the index ED visit; a self-reported diagnosis of dementia or cognitive impairment; or documentation of a memory-related condition in the medical record.

Statistical Analyses

Quantitative Analyses—Differences in participant characteristics and intervention visit logistics were calculated using Pearson's chi-square and two-sample t-tests. Mixed effects linear regression was used to analyze within- and between-subjects differences in patient activation (i.e., level of engagement and self-management in one's own health plan) across multiple data collection time points (36). Pairwise comparisons of marginal linear effects using the Bonferroni method for multiple comparisons were conducted to determine the magnitude of changes in participant activation between each time point and the next. Finally, we conducted restricted maximum likelihood linear mixed effects regressions to test for site- and coach-level differences in CTI content delivery (DSI) over time. Study time (years since first subject enrolled, centered to the site median) and the interaction between study time and site were treated as fixed effects, while community paramedic coach ($N=8$, nested within site) was treated as a random effect. As all participants should have received their home visits and initial phone visits, and DSI rates did not substantially change during the second and third phone visits, analyses were restricted to comparisons of DSI at home visits and initial phone calls. Statistical significance was defined as $p<0.05$, except when corrected for multiple comparisons.

Qualitative Analyses—Two trained coders tagged segments of participant comments based on an iteratively developed coding manual. Segmented content was used for assessing

each predetermined implementation outcome. We used thematic analysis (38) to identify patterns reflecting barriers to completing coaching visits and enacting previously discussed care transition behaviors, as well as patient perspectives on acceptability and satisfaction with the CTI. This iterative reflexive process involved two coders who did not conduct the initial segmentation, working in tandem and individually to systematically generate themes and sub-themes capturing participant experiences and influencing factors. This same process was used to identify thematically derived categories of goals set by participants and/or coaches during coaching visits. To quantify the prevalence of goal types, coders returned to the data and conducted a content analysis of each participant's recorded goals to generate frequencies.

Directed content analysis was conducted on data related to decision-making about future follow-up phone visits, each participant's expressed intention to attempt care transition behaviors (per pillar) and reported attempts at trying those behaviors. Finally, content analysis using structural coding (39) was employed to determine reasons why home visits were cancelled among participants who were scheduled for the sessions but did not complete them. This analysis was conducted sequentially by two coders, using coach visit logistics notes and participant tracking records.

Results

Fidelity of Delivery

Coverage (Reach)—Of the 863 intervention group participants scheduled home visits for the CTI, 726 (84.1%) did within the required 24-72 hours after ED discharge. Cancellations were almost exclusively patient-generated (94.9%). Participants who were scheduled to receive the home visit but did not were more likely to be cognitively impaired ($p<0.001$) and less likely to have attained a college degree ($p=0.02$) (Table 2).

Dose (Visit Characteristics)—Table 3 details visit completion rates and time expended on preparation, travel, service delivery, and documentation, including differences between the two sites. Each participant who received a home visit was scheduled for at least one community paramedic coach follow-up phone visit. Most follow-up phone visits were successfully completed (94.6%). Additional phone visits were completed at slightly lower rates than the initial calls. Coaches placed an average of 1.6 calls for each scheduled phone visit. Decisions to schedule additional phone visits were led by coaches (55.8%), followed by participants (27.4%) and joint decisions (16.8%).

Content—The proportions of CTI content delivered during coaching visits are presented in Table 4, split by site. Overall, coaches delivered red flag planning content at rates averaging 95% or greater. Post-discharge goal setting also averaged high rates of delivery (96% and above). Discussing the use of a personal health record was also delivered at rates of 88% and above, and content on medication discrepancies was delivered with similar fidelity rates (84% and above). Content delivery for scheduling outpatient follow-up was lower, overall averaging around 75% completeness.

Although there was general consistency in delivery patterns across home and phone visits within site, mixed effect models revealed differences in content delivery as the study progressed. We found larger discrepancies in DSI proportions between Site 1 and Site 2 during the first year of data collection than at the midpoint or final year. During home visits in the first year of data collection, Site 1 coaches reported DSI scores 0.14 (95% CI: 0.05-0.22) points higher than Site 2. This difference narrowed but remained significant over time [0.10 at midpoint (95% CI: 0.01-0.18); 0.11 in the final year (95% CI: 0.02-0.20)]. These differences also existed for the first phone visit, with Site 1 recording DSI scores 0.22 higher than Site 2 (95% CI: 0.17-0.28) in the first year, 0.11 (95% CI: 0.05-0.17) at midpoint, and 0.08 in the final year (95% CI: 0.02-0.14). This pattern of change was almost entirely due to improvements at Site 2 over the first half of the study [increasing 0.05 (95% CI: 0.03-0.07) for home visits and 0.11 (95% CI: 0.09-0.14) for phone visit 1]. Site 1 DSI delivery rates remained relatively stable. Mixed effects models further revealed that 42.9% of variance was accounted for by coach-level differences in delivery.

Participant Engagement

Treatment Receipt—Overall, participants showed a 2.46 point increase in activation over the 30-day study period [95% CI: 2.29-2.64]. Within-subject pairwise comparisons between study visits (Figure 2) showed a significant improvement in activation scores resulting from each additional phone visit. The pattern of increase was similar for each site, however Site 2 participants had higher scores than Site 1 participants across all time points.

Treatment Enactment—Most participants (89.0%) told coaches they would follow up with outpatient clinicians, but only 60.6% later reported completing follow-up visits. Fewer than half (44.3%) expressed willingness to complete the personal health record, and only 19.3% attempted to use the tool. Coaches helped 510 (70.4%) participants identify health-related goals they agreed to work towards during the study period, and 262 (51.4%) reported attempting goal-related behaviors. We identified five common types of patient-generated goals: improving physical activity (29.3%), obtaining health care services and/or improving communication with health care personnel (23.3%), changing dietary behaviors (14.3%), improving symptom management or biometric screening results (12.5%), and engaging in activities to improve mental health and wellbeing (12.3%).

Participant Perspectives

Acceptability and Appropriateness—In our post-study survey, 88.0% of participants said they would be likely or extremely likely to choose an ED that offered the CTI over one that did not. Participants felt that the experience was beneficial for managing their health following their ED visits, the quality of community paramedic coaching was high, and a few stated that the CTI should be routine following ED discharge, either for older adults or all patients. Almost all satisfaction-related comments were positive, indicating high acceptability for the program (themes and supporting excerpts in Supplemental Table 1). Negative comments about the CTI mostly related to not finding the program helpful for themselves or participants feeling that they were not the most appropriate recipients. Many noted that it would be valuable for others, particularly those who were older, in worse health, or less comfortable navigating the health care system. Some even said they planned to share

intervention materials with a specific family member whom they believed would benefit more.

Three of the four CTI pillars received overall positive feedback from participants, but the CTI pillar of keeping a personal health record received substantial mixed or negative feedback. Those who disliked the personal health record described it as cumbersome, overwhelming, or unnecessary. Many told their coaches they already had electronic or paper-based systems in place to track their health records and/or medications, and that their current systems served them well or they had no desire to transfer information into the CTI personal health record format. However, for participants not already using a health record system, the hard copy booklet was reported to be helpful.

Patient-centered Outcomes—Participants who adopted targeted behaviors reported benefits when communicating with their clinicians—specifically being able to organize their questions, discuss post-ED treatment plans productively, and advocate more effectively about their health care needs (see examples in Supplementary Table 1). Coaches described the downstream benefits of having in-depth discussions about where and when to seek emergency care, particularly for participants who were reluctant to do so or over-reliant on non-acute services. The social aspect of the intervention was also often valued as much or more than knowledge gained. Participants commented that having repeated interactions with coaches increased their motivation and made them feel more accountable for following through on behaviors they had previously discussed as it provided support that they felt they otherwise lacked.

Coaching Perspectives

We grouped coach-recorded barriers with intervention implementation into five themes (supporting excerpts in Supplemental Table 2). One theme was the absence of participant need around a specific pillar, such as among participants who did not have to make medication changes after their ED visits, or those without specific outpatient follow-up instructions. Two themes describe barriers that prevented CP coaches from effectively delivering CTI content. The first involved medical problems or symptoms interfering with intervention delivery or the participant's ability to engage with CTI content. These medical-related issues either hampered coach communication with the participant or negatively affected patient participation. The other delivery-related barrier involved difficulties with phone visit coordination—specifically getting participants to reschedule previously cancelled phone visits. In addition to typical phone visit problems (e.g., returning messages), community paramedic coaches also reported technological problems, unexpected scheduling conflicts, and having to involve other family members to help engage participants.

The final two themes centered on participant engagement. The first pertained to participant refusal to communicate with coaches about the program or showing a lack of interest when discussing care transition topics. The other reflected participants' resistance to considering or attempting targeted care transition behaviors. This resistance to engage in CTI-related behaviors was described by coaches either as active, overt acts of non-cooperation (e.g.,

refusing to get medication bottles when requested by the coach), or as passive inaction (e.g., not following through).

Discussion

In this multimethod evaluation of the community paramedic-delivered CTI during the ED-to-home transitions, we demonstrated that it is feasible for trained community paramedic coaches to deliver the adapted CTI to community-dwelling older adults with high fidelity. Critically, this multi-faceted assessment evaluated fidelity both in terms of how the intervention was delivered (coverage, dose, and content) and how it was received (receipt, enactment, acceptability, and appropriateness). We also identified additional patient-centered outcomes and barriers to implementation. Our process evaluation demonstrated that community paramedics can be an effective resource for conducting complex patient-centered and behavior change interventions. Further, this evidence supports the potential for community paramedics to perform home-based health services to vulnerable populations and those unable to easily access care in clinical settings.

Assessing fidelity allowed us to distinguish whether treatment effects were due to the intervention or artifacts of its implementation (33). Our findings of the effectiveness of program implementation processes give us confidence that results reported in our intervention effectiveness studies were not driven by implementation-related factors. It was also critical to measure the implementation in terms of content *and* process comparatively at each research sites when examining effectiveness. Despite staff being trained jointly and having the same protocols, we observed differences in delivery fidelity at the home visit and the first phone follow-up visit, with Site 2 showing lower fidelity. However, once this discrepancy was noted, Site 2 improved delivery fidelity to parallel the Site 1's rate. This highlights the importance of fidelity monitoring throughout an intervention delivery period, as it allows differences to be identified and addressed, leading to decreased discrepancies and improved fidelity overall.

Participants' acceptance of the CTI program and adoption of care transition behaviors emphasizes the program's potential to improve post-ED outcomes. Participants accepted the program at high rates, increasing their knowledge of self-management behaviors and attempts to act on them. There was also an unexpected but welcomed willingness to pass intervention materials along to family or friends whom they identified as needing support. Even for those who felt that it was not appropriate for their individual specific needs (or lack thereof), almost all said that there were others whom they thought would benefit from the CTI.

Not every CTI pillar was favored by participants, however, with the personal health record deemed the least acceptable component of the CTI. Participants disliked the single option of a paper form, especially if they already had health record systems in place. Understanding which CTI elements are core components that should be delivered according to strict guidelines, and which can be omitted or tailored to meet participant needs, improves the replicability and the feasibility of future implementations. Future adaptations should explore

alternative formats, and the best ways to tailor these formats to participant needs and preferences.

Data about delivery characteristics and visit logistics (dose) can also be used by health care systems and EMS agencies to ascertain the feasibility of implementing this type of care transitions program within their organizational context—applying it to calculate possible staffing coverage and associated delivery costs. CTI delivered by community paramedics could offer an additional pathway to increase the health care workforce and leverage a little-tapped source of acute care expertise embedded within community settings. That adaptation has the potential to increase access to care transition programs. Further, future studies can explore alternative methods of program delivery that decrease costs while maintaining effectiveness (e.g., remotely delivered home visits using video). EMS agencies and health care systems should facilitate development of these skillsets and conduct evaluations of programs delivered by community paramedics, building an evidence base for continued use of this vital resource in the provision of patient-centered care in community settings.

Limitations

Qualitative data collected in this study were captured from the coaches' free-text notes about the interactions with participants during the delivery of the CTI, which is not as rigorous as a formal qualitative study with extensive interviews with each participant. The coaches were trained to take notes for operational and program delivery purposes and this training was reinforced, but they were not required to routinely record comments related to participant satisfaction or specific barriers to receipt or enactment of CTI content. Thus, the notes may not have accurately represented the coaches' or participants' complete views about the program or their experience. Quoted phrases may not have represented the actual language participants used. These issues could have subtly affected the construction of themes. Furthermore, although trained similarly and to the same standards, the coaches' documentation varied, potentially affecting the depth of data available for qualitative analysis and our understanding of patient engagement with the CTI program.

Notably, this protocol was conducted and completed before the COVID-19 pandemic. It is possible that under pandemic conditions the outcomes of the CTI may differ from what we found. However, we feel that our findings can provide a basis for CTI implementation in a post-COVID world.

Finally, generalizability of our findings may be limited. The lack of diversity on some key participant characteristics (e.g., race/ethnicity) restricts generalizability to communities with different demographic representation. Further, we only included participants with primary care clinicians within two health care systems and excluded other types of vulnerable older adult patients (e.g., non-English speaking, significant hearing/visual impairments after correction). Because of this, it is possible that our findings may not directly apply to some older ED patients. Future studies of the CTI could focus on adapting the program to accommodate for these at-risk parties through means of visual aids, community outreach services, and/or inclusion of translators; creating a more inclusive CTI program that can better service the needs of the variety of older adult patients who use the ED (40).

Conclusion

Community paramedic coaches delivered the adapted CTI with high levels of fidelity and successfully facilitated participant engagement with program content. Fidelity monitoring throughout the study identified and helped correct discrepancies/deviations in delivery. Most participants were highly satisfied with the CTI, with the personal health record being the only component to receive negative feedback. Community paramedic coaches noted barriers to implementation based on patient health problems, visit coordination, and limited communication from participants. Future implementations of this program should review these components, tailoring the CTI to the needs of each patient to improve health outcomes.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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	Enrollment	Home Visit	Follow-up Call 1	Follow-up Call 2 ^a	Follow-up Call 3 ^a
Logistics	<ul style="list-style-type: none"> Occurs at index ED visit Participant randomized prior to ED discharge 	<ul style="list-style-type: none"> In-person visit at participant residence 24-72 hours after ED discharge Delivered by trained CP coach 	<ul style="list-style-type: none"> Participant telephone visit with CP coach Occurs ~1 week following home visit 	<ul style="list-style-type: none"> Participant telephone visit with CP coach 	<ul style="list-style-type: none"> Participant telephone visit with CP coach
Activities	<ul style="list-style-type: none"> Screen for eligibility and capacity Explain research study and intervention Obtain informed consent Schedule CTI home visit Conduct in-person verbal baseline survey 	<ul style="list-style-type: none"> Reconcile and review medications Emphasize need for outpatient follow-up Educate about "red flags" Discuss personal health record Health-related goal setting Schedule follow-up phone call 	<ul style="list-style-type: none"> Support participant Reinforce coaching and training Answer questions about previously covered content Provide referral source as needed 	<ul style="list-style-type: none"> Support participant Reinforce coaching and training Answer questions about previously covered content Provide referral source as needed 	<ul style="list-style-type: none"> Support participant Reinforce coaching and training Answer questions about previously covered content Provide referral source as needed
Data Collected	<ul style="list-style-type: none"> Demographics Individual characteristics Health status Cognitive status Psycho-social measures Perceived health self-efficacy 	<ul style="list-style-type: none"> Visit logistics & characteristics Delivered services inventory Patient activation assessment Free-text notes (overall and per pillar) 	<ul style="list-style-type: none"> Call logistics & characteristics Delivered services inventory Patient activation assessment Free-text notes (overall and per pillar) 	<ul style="list-style-type: none"> Call logistics & characteristics Delivered services inventory Patient activation assessment Free-text notes (overall and per pillar) 	<ul style="list-style-type: none"> Call logistics & characteristics Delivered services inventory Patient activation assessment Free-text notes (overall and per pillar)

Figure 1. Flow of research activities experienced by participants in the intervention arm of the randomized control trial

^aScheduled as determined necessary by coach during prior follow-up phone call

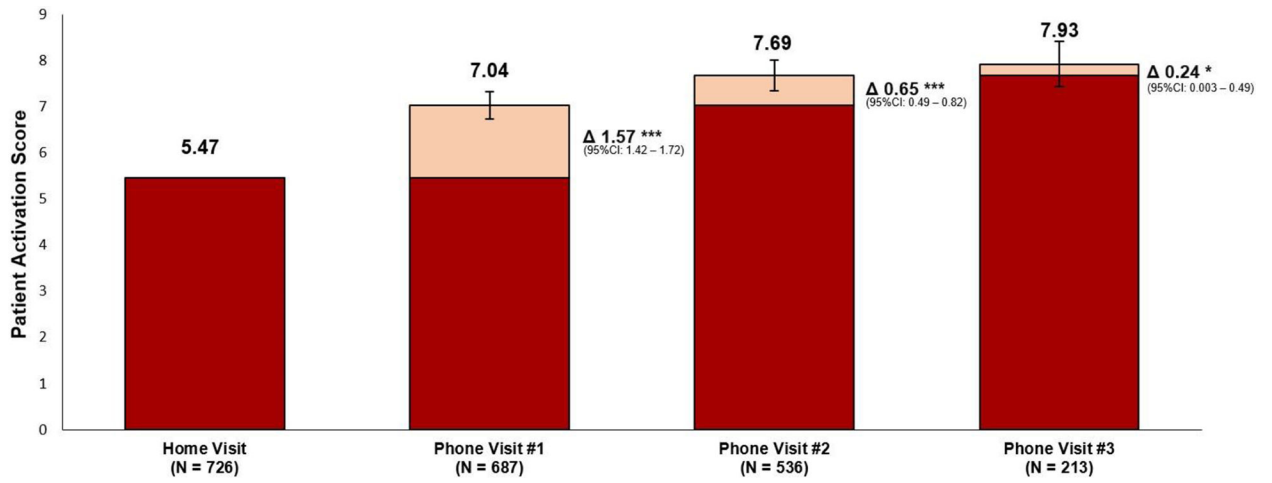


Figure 2. Dose effects of coach phone visits, measured as within-subjects changes in Patient Activation Assessment score

Note. Lighter coloring indicates between visit differences.

Table 1. Program evaluation domains, outcomes, and methodological approaches used in quantitative and qualitative analyses ^a

Implementation Fidelity Domains	Process Evaluation Measures & Outcomes	Data Sources					Analytic Approach
		Coach Notes	DSI	PAA	Research Surveys	Medical Record	
Coverage (Reach)	Participant characteristics (those receiving the home visit vs. those scheduled but did not complete it)	X			X	X	Pearson's chi-squared and two-sample t-tests
	Home visit completion rate, overall and by site	X					Descriptive data and two-sample t-tests
	Reasons for cancelling home visits	X					Structural coding; Content analysis
Dose	Characteristics of home visits and follow-up calls, overall and by site	X					Descriptive data and two-sample t-tests
	Who decided whether or not to schedule follow-up calls (coach or participant)	X					Content analysis for frequencies
CTI Content	CTI content delivery (DSI), overall and by site		X				Descriptive analysis of DSI assessment data
	Changes in content delivery patterns (DSI) across study duration, by site		X				Restricted maximum likelihood linear mixed effects regression
	DSI variability due to individual coach differences		X				Restricted maximum likelihood linear mixed effects regression
Treatment Receipt	Changes in participants' functional understanding of care transition behaviors; Dose effects	X		X			Mixed effects linear regression; Pairwise comparisons of marginal linear predictions (Bonferroni)
	Intention to try care transition behaviors; Reported attempt at behaviors (per pillar)	X					Structural coding; Content analysis for frequencies
	Type and frequency of health-related goals set by participants	X					Thematic analysis; Content analysis for frequency
Participant Engagement	Acceptability of intervention and components	X			X		Descriptive data; Thematic analysis
	Appropriateness of intervention and components	X			X		Thematic analysis
	Patient-centered outcomes of intervention (benefits, value, and facilitators)	X					Thematic analysis
Barriers	Barriers to intervention implementation	X					Structural coding; Thematic analysis
	Barriers to adoption of care transition behaviors	X					Structural coding; Thematic analysis

^aData Source Legend: Delivered Services Inventory (DSI), Patient Engagement Assessment (PAA)

Table 2.

Characteristics of participants randomly assigned to receive the Care Transitions Intervention, stratified by intervention receipt^a

Characteristic	CTI Received (n=726)	CTI Scheduled, Not Received (n=137)
Age (M[SD])	72.82 (8.65)	71.95 (8.61)
Sex = Male (%)	336 (46.3)	69 (50.4)
Race = Non-White (%)	43 (5.9)	14 (10.5)
Ethnicity = Hispanic (%)	9 (1.2)	3 (2.2)
Education = Some College or Less (%)	271 (37.4) [*]	66 (48.9) [*]
Marital Status = Not Married (%)	300 (41.3)	61 (45.2)
Number of Comorbidities ⁴¹ (M[SD])	2.75 (1.63)	3.04 (1.74)
Impairments in Activities of Daily Living ⁴² = 1+ (%)	280 (38.7)	52 (38.8)
Cognitive Impairment = Impaired (%)	59 (8.1) [*]	24 (18.2) [*]
Health Literacy ⁴³ = Inadequate (%)	91 (12.7)	25 (18.5)
GAD-2 ⁴⁴ = Anxiety Disorder (%)	115 (15.9)	23 (17.0)
PHQ-9 ⁴⁵ = Moderate to Severe Depression (%)	79 (11.0)	15 (11.1)
PHCS ⁴⁶ Sum (M [SD])	30.43 (5.25)	29.64 (5.51)
SF-12 ⁴⁷ : Self-Rated Overall Health = Fair or Poor (%)	340 (47.3)	71 (53.0)

^aAbbreviations: CTI=Care Transitions Intervention, GAD-2=Generalized Anxiety Disorder-2, PHQ-9=Patient Health Questionnaire-9, PHCS=Perceived Health Competency Scale, SF-12=Short form-12

^{*}*p*<0.05

Table 3.Visit characteristics by site^a

Visit Completion Rates, n (% of scheduled)		
Visit	Site 1	Site 2
Home Visit	368 (100.0)	358 (100.0)
1st Phone Visit	335 (91.0) *	352 (98.3) *
2nd Phone Visit	263 (91.0)	273 (93.2)
3rd Phone Visit	124 (89.2)	89 (87.3)
Coach Time per Visit Activity, M [SD]		
Visit Activity	Site 1	Site 2
Home Visit: Pre-Visit Preparation	12.17 (4.54) *	5.76 (4.45) *
Home Visit: Travel (Driving)	43.88 (13.58)	42.22 (30.40)
Home Visit: CTI Delivery	51.58 (18.75)	52.28 (15.29)
Home Visit: Post-Visit Documentation	26.56 (12.92) *	23.20 (9.08) *
Phone Visits: Pre-Visit Preparation	4.49 (3.16) *	3.93 (1.94) *
Phone Visits: CTI Delivery	10.24 (5.33)	10.43 (6.14)
Phone Visits: Post-Visit Documentation	12.70 (6.34)	13.14 (5.04)

^aAbbreviations: CTI=Care Transitions Intervention*
 $p < 0.05$

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Table 4.

Proportion of Care Transitions Intervention content delivered by coaches at each visit, by site

	Site 1				Site 2			
	Home Visit	Phone #1	Phone #2	Phone #3	Home Visit	Phone #1	Phone #2	Phone #3
Medication discrepancies	0.95	0.96	0.96	0.95	0.79	0.73	0.72	0.75
Use of the patient health record	0.95	0.88	0.87	0.85	0.94	0.89	0.88	0.93
Outpatient follow-up	0.91	0.91	0.91	0.91	0.61	0.58	0.55	0.54
Red flag management	1.00	0.99	0.98	0.95	0.98	0.93	0.92	0.93
Participant health-related goals	0.96	0.94	0.95	0.95	0.99	0.98	0.99	0.99

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