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Automated telephone follow-up programs after hospital discharge: Do older adults engage with these programs?

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Abstract

Background—Health systems have developed automated telephone call programs to screen and triage patients' post-hospital discharge issues and concerns. The aims of our study were to determine whether and how older adults engage with automated post-hospital discharge telephone programs and to describe the prevalence of patient-reported post-discharge issues.

Methods—We identified all telephone calls made by an urban academic medical center as part of a post-hospital discharge program between May 1, 2018, to April 30, 2019. The program used automated telephone outreach to patients or their caregivers that included 11 distinct steps three days post- discharge. All adults discharged home from the hospital, were included, and we categorized patients into 64 years, 65–84 years and 85-year age-groups. We then compared call reach rate, completeness of 11-step calls and patient-reported issues between age-groups.

Results: 18,076 patients were included. More patients 65–84-years-old were reached compared to patients 64-years-old (AME 5.52%; 95%CI 3.58%−7.45%). Completion rates of automated calls were also high across age categories. Patients 85-years-old were more likely to have questions about their follow-up plans and need assistance scheduling appointments compared to those 64-years-old (19.0% vs. 11.9%, AME 7.03% (95%CI:2.74%−11.32%).

Conclusion: Post-hospital automated telephone calls are feasible and effective at reaching older adults. Future work should focus on improving discharge communication to ensure older adults are aware of their follow-up plan and appointments.

Keywords

Transitional care; Telemedicine; Health Services Delivery

Introduction

Older adults aged 65-years-old represent nearly half of all hospitalizations[1,2] and are particularly vulnerable to poor post-hospitalization outcomes.[3–6] Post-discharge telephone calls seek to identify patients who require guidance about their recovery, extend care and support after hospitalization and in some settings have the potential to improve patient satisfaction and reduce hospital readmissions.[7–9]

Post-discharge telephone call programs seek to reach every patient. Different types of models have been studied to determine which is most effective at reaching the most patients including nurse-led, pharmacy-led, physician-led, as well as those with decentralized or centralized call centers.[10–13] For most health systems, reaching every patient is not feasible given the large volume of discharges and significant staff resources that this entails. To address this, post-discharge telephone programs have been implemented that use automated, voice-enabled calls that contact and screen patients to identify recovery needs, and then triage patients for additional telephone follow-up with a clinician. While the use of automated calls may streamline processes and have been shown in some settings to maximize reach rate, there is emerging evidence that for some vulnerable populations automated calls are less likely to reach and benefit patients.[14] There is also concern that some older adults may not interact with automated or other digital services as much as younger adults.[15,16]

The degree to which older adults recently discharged from hospital are reached and engage with automated post-discharge telephone call programs has not been fully explored. Therefore, the first aim of our study is to determine how older adults engage with an automated post-discharge telephone call program. Secondly, we will measure the prevalence of post-discharge patient-reported issues and their association with age.

Methods

Design, setting, participants and oversight

We performed a retrospective cohort study at the University of California San Francisco (UCSF) Medical Center between May 1, 2018, and April 30, 2019. We included all patients 18 years who were discharged to home from any discharging service. We excluded patients who were discharged with home hospice (n=251) or did not have a telephone number (n=92). For patients with multiple admissions during the study period, we only included the first admission. The UCSF Institutional Review Board approved this study.

The Care Transitions Outreach Program

The UCSF-wide care transitions outreach program has been operational since March 2017. The program's goal is universal contact with all patients discharged from the hospital or their caregiver to identify and address care transition problems within 3-days of discharge. A third party (CipherHealth Voice, New York, NY) delivered a scripted, automated call that includes 11 distinct steps – with six asking about post-discharge issues (see outcomes). Patients could opt to hear and respond in English, Spanish, and Cantonese, the three most

common languages spoken by patients admitted to UCSF.[14] The automated script can be found in Supplementary Table S1.

The automated calling program attempted to call patients at their preferred contact telephone number listed in the electronic medical record (EMR) up to five times per day at different times for two consecutive days. Messages were left on the first call attempt with instructions to call back into the automated call system to answer questions. If the patient did not answer their preferred contact number and if available, an automated call attempt was then made to any secondary number of a caregiver listed in the EMR. If any patient or caregiver answered the automated call and identified an issue, a nurse would call the patient manually to follow up. If a patient failed to answer the automated call and met specific criteria (i.e., specifically age 85 years, discharged home with services, non-English speaking, or part of the study site's Medicare accountable care organization) a nurse would call the patient if they had not already been contacted by another clinician (e.g., primary care provider, discharging physician). For all manual calls, patients were attempted to be contacted three times over two consecutive days.

Measures: Age and other sociodemographic and clinical comorbidities

Patients' age was obtained from the EMR. We classified age into 64 years, 65–84 years and 85 years. Other sociodemographic and clinical data were obtained from the EMR (gender, race, ethnicity, marital status, insurance, discharging service, discharge disposition, length of stay). Using administrative data, we determined patients' discharge diagnoses with ICD-10-CM diagnosis codes; we used these codes to calculate the Elixhauser score for each patient. The Elixhauser score is comprised of 30 comorbidities (claims-defined) and was developed to predict hospital length of stay, cost, and mortality.[17]

Outcomes: Reach rate

Patient reach was classified into 1) If a patient or caregiver answered the automated call and at least one clinical question, we classified them as "older adult answered automated call", 2) If a patient or caregiver did not answer the automated call, we determined if the patient "met criteria for a manual call", 3) Among those eligible for a manual call, if the nurse successfully reached a patient by a manual call, we classified them as "reached by a manual call." We also characterized reach as a continuous variable to investigate how many of the 11-steps contained in the automated call patients or caregivers responded to, and whether there were any age differences in the completeness of calls.

Outcomes: Patient-reported, post-discharge issues

The six post-discharge issues related to questions about discharge instructions, difficulty getting prescriptions, medication concerns, questions about follow up care, new or worsening symptoms, or any other clinical issues not already addressed (Appendix 1).

Analysis

To compare baseline variables, we used chi-square tests, t-tests for normally distributed continuous measures and Wilcoxon rank sum test for nonnormal distributed measures. We determined association between age group (64 years, 65–84 years and 85 years) and

reach by fitting separate models for each stage of outreach (successful reach by automated call, met criteria for manual call, and successful reach by manual call). Similarly, we determined the association between age group and each post-discharge issue by fitting a separate model for each patient-reported issue. For each model, patients were included if they responded to the question corresponding to the post-discharge issue. All models were fit using generalized estimating equation with a log link and Poisson distribution[18] adjusted for sociodemographic and clinical confounders. We report the regression results as the predicted population rates and average marginal effects (AME) along with the 95% confidence intervals.[19] We assessed differences in the completeness of calls between each age group using ANOVA. We completed analyses in Stata 16.0 (StataCorp, College Station, TX).

Results

Participant Characteristics

During the study period, 18,076 patients were discharged home from inpatient hospitalizations, and 12,012 (66.5%) were 64-years-old, 5,426 (30.0%) were 65–84-years-old and 638 (3.5%) were 85-years-old (Table 1). Patients 65–84-years-old were more likely to be White Caucasian with Medicare, while those 85-years-old were more likely to be Asian, have limited English proficiency and report shorter hospital length of hospital stays.

Age and patient reach

The care transition program reached >78.8% of all discharged patients or caregivers, although there were some significant differences between age groups (Figure 1). Significantly more 65–84-year-olds were reached by automated calls compared to 64-year-olds (average marginal effect [AME] 5.5%; 95%CI 3.6% to 7.5%). While more 85-year-olds were reached compared to 64-year-olds, this difference was not statistically significant. When patients or caregivers did not answer the automated call, 65–84-year-olds were more likely to meet the criteria for a manual call (24.9% vs. 15.1%; AME 9.8%, CI 4.8% to 14.8%) as were those 85 years (49.1% vs. 15.1%; AME 33.9%, CI 22.8% to 45.1%). Of all patients meeting the criteria for a manual call, no differences in reach rate by age group were identified.

Completeness of calls

Completion rates of automated calls was high for all age categories. Of the 11 potential steps in each automated call, the mean question number reached was 10.1 (s.d. 2.2) for those aged 64-years-old, 10.3 (s.d. 2.0) for those 65–84-years-old and 10.0 (s.d. 2.1) for those 85-years-old. While these means were significantly different ($F_{2,14440} = 20.64$, p<0.01) they were not clinically significant given that on average, regardless of age, patients reached step 10 of the automated call that assessed the last potential post-discharge issue namely 'other clinical issues".

Age and patient outcomes

Nineteen percent of patients 85-years-old who were reached by an automated call had questions about their follow-up plan and needed assistance scheduling appointments or

home visits (Table 2). This was significantly higher compared to patients 64-years-old (19.0% vs. 11.9%, AME 7.0% (95%CI:2.7% to 11.3%). For all other patient-reported problems there were no significant differences by age.

Discussion

Despite our *a priori* hypothesis that that automated telephone calls to older adults or their caregivers would not be successful, we found the opposite. For older adults, this finding is encouraging given national data reporting that most adults of all ages do not answer unknown telephone numbers[20] as well as increasing concerns regarding answering unknown calls and the potential for fraud.[21]

Overall, more than 78% of all patients or caregivers, were reached by an automated call with higher reach rates reported for those 65–84-years-old and 85-years-old. Our findings support health systems use of automation in post-discharge telephone call programs to screen and triage patients most in need to receive follow-up by a clinician. From a health system perspective this utilizes resources more efficiently by reducing the need for individual staff members to call each patient and directs clinical care to those with potential poor hospital outcomes. We also did not find any clinically significant differences between age groups in relation to the completeness of calls - those who answered the automated call completed all automated steps asking about potential post-discharge problems. This further highlights the utility of automated calls as a method to effectively engage patients in post-hospital outreach.

This current study builds on smaller and targeted studies looking at the role of post-hospital automated calls to identify patients most in need of transitional care.[22–25] For example, a study involving 1,095 high risk heart failure patients and another with 6,867 patients at a large health system, found reductions in hospital readmissions for those completing the automated call process.[22,25] Our study aligns with other studies demonstrating feasibility and effectiveness of post-discharge automated calls for patients discharged from the emergency room or with other chronic diseases.[23,24].

Despite an overall high automated call reach rate, for those not reached and eligible for manual call, we found that only 28% of patients 65-to-84-years-old and 39% of those 85-years-old were able to be reached. Given these patients are vulnerable based on their sociodemographic characteristics, exploring reasons for this finding is an important next step for our health system. Older adults in our study who were reached reported knowledge gaps and a lack of understanding of their outpatient or home healthcare follow-up care plans and appointments – a problem that persisted for both older age group categories evaluated but was greatest for those aged 85-years-old. While this finding may reflect the fact that these older adults have more complex follow-up plans, or need more post-discharge appointments, the fact that unanswered questions remain after discharge indicate that follow-up care plan details are not either not communicated, understood or recognized during the discharge process suggesting opportunities for further investigation and improvement. Also, while statistically significant differences were not found between age groups for other patient-reported problems, automated calls still identified the need for additional outreach

to more than 10% of older adults due to medical concerns, new or worsening symptoms, or other clinical issues. This highlights the importance of these program as a system-wide care transitional intervention.

Our study has several limitations including it was conducted at an urban academic medical center meaning the findings may not be generalizable to other settings. There is also the potential for unmeasured confounding to influence our observed relationship between age and post-discharge reach and issues such as health literacy, educational level, employment status, or readmission risk. We are also unable to determine whether automated calls were answered by patients themselves or their caregivers.

In this study, we demonstrated that a care transitions outreach program can reach most older adults or their caregivers using automated calls and that call completion was high. We also showed the effectiveness of such an outreach program at identifying post-hospital problems experienced by older adults. Specifically, knowledge gaps and a lack of understanding of outpatient or home healthcare follow-up appointments was the main problem identified. Future work should focus on improving discharge communication and processes to ensure all older adults are aware of their post-hospital follow-up plan and appointments. Other work could investigate other potential outcomes of success related to this care transition outreach program such as readmission prevention, planned and unplanned health service utilization, satisfaction, and healthcare costs.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

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Key Points

- The aims of our study were to determine whether older adults or their caregivers engage with an automated post-hospital discharge telephone program and to describe patient-reported issues.

- Post-hospital automated calls are feasible and effective at reaching older adults or their caregivers.

- Older adults 85-years old were significantly more likely to need help and support about their follow-up plans and need assistance scheduling appointments.

Why does this matter?

A widely implemented initiative to support older adults following the hospital to home transition are automated post-discharge telephone calls. These calls have the potential to identify older adults who require guidance about recovery, address unanswered questions, and extend care and support after the acute phase of hospital illness.

Key

Received an automated call
(n=18,076)

Eligible for automated or manual call

Reached by automated call (n=14,143)
≤ 64 years: 78.9%
65-84 yrs: 84.3% (Difference 5.5, 95%CI: 3.6 to 7.5)
≥ 85 yrs: 81.0% (Difference 2.2, 95%CI -1.6 to 6.0)

Not Reached
(n=3,933)

Reached by automated or manual call

Not reached

Met Criteria for manual call (n=516)
≤ 64 years: 15.1%
65-84 yrs: 24.9% (Difference 9.8, 95%CI: 4.8 to 14.8)
≥ 85 yrs: 49.1% (Difference 33.9, 95%CI 22.8 to 45.1)

Did not reach criteria for manual call
(n=3,417)

Reached by manual call (n=167)
≤ 64 years: 33.1%
65-84 yrs: 28.5% (Difference -4.6, 95%CI: -17.7 to 8.4)
≥ 85 yrs: 39.3% (Difference 6.2, 95%CI -11.7 to 24.1)

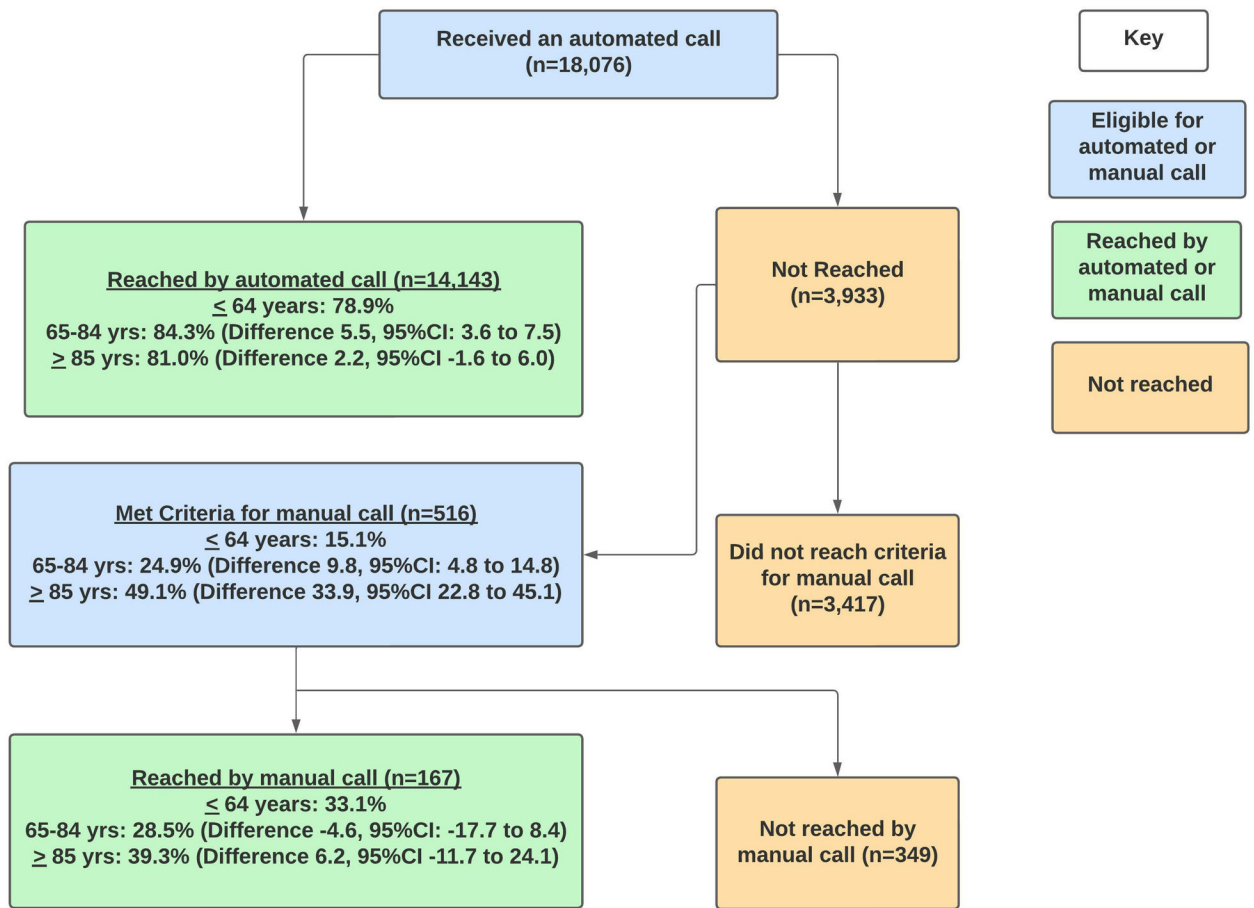Not reached by manual call (n=349)

Figure 1: Post-discharge Program Reach by Age Group, Adjusted Probability, and Marginal Effect

Predicted probabilities from the adjusted model are presented. Separate models are fit at each stage (i.e., reached by automated call, met criteria for manual call, reached by manual call). All models were adjusted for the following confounders: gender, race, ethnicity, marital status, insurance, discharging service, Elixhauser score, discharge disposition, length of stay. For all differences, $p < 0.01$.

All patients in the study were eligible for an automated call. If a patient failed to answer the automated call and met any of the following specific criteria—age > 85 years, discharged home with home services, limited English proficiency, or part of the study site's Medicare accountable care organization—a centralized care transition nurse would review the patient's chart and call the patient manually if they had not already been contacted by a clinician (physician, nurse practitioner, physician's assistant) or had another health care encounter.

Table 1:

Patient characteristics of discharged patients by age group (n=18,076)

	Age group			
	(64 years)	(65–85 years)	(85 years)	p-value
	N=12,012	N=5,426	N=638	
	n (%)			
Age (Mean, S.D)	47.5 (12.5)	72.6 (5.3)	89.8 (3.7)	<0.01
Gender				<0.01
Female	5,997 (49.9)	2,252 (41.5)	314 (49.2)	
Male	6,015 (50.1)	3,174 (58.5)	324 (50.8)	
Ethnicity				<0.01
Hispanic or Latino	2,473 (20.6)	507 (9.3)	49 (7.7)	
Not Hispanic or Latino	9,539 (79.4)	4,919 (90.7)	589 (92.3)	
Marital status				<0.01
Divorced/Separate	992 (8.3)	474 (8.77)	27(4.2)	
Married/Partnered	6,100 (51.8)	3,608 (66.5)	296(46.4)	
Single	4,675 (38.9)	809 (14.9)	36 (5.6)	
Widowed	245 (2.0)	535 (9.9)	279 (43.7)	
Primary race				<0.01
Asian	1,642 (13.7)	993 (18.3)	220 (34.5)	
Black or African American	1,268 (10.6)	329 (6.1)	18 (2.8)	
Caucasian or White	6,359 (52.9)	3,409 (62.8)	312 (48.9)	
Hawaiian/Pacific Islander	165 (1.4)	57 (1.1)	17 (2.7)	
Native American	137 (1.1)	32 (0.6)	3 (0.5)	
Other	2,441 (20.3)	606 (11.2)	68 (10.7)	
Insurance [*]				<0.01
Commercial	6,072 (50.6)	575 (10.6)	11 (1.7)	
Medicaid	4,058 (33.8)	175 (3.2)	7 (1.1)	
Medicare	1,740 (14.5)	4,649 (85.7)	620 (97.2)	
Other	142 (1.2)	27 (0.5)	0	
Limited English proficiency	1,057 (8.8)	836 (15.4)	212 (33.2)	<0.01
Hospital service				<0.01
Medicine	5,383 (44.8)	2,588 (47.7)	503(78.8)	
Surgery	6,629 (55.2)	2,838 (52.3)	135 (21.2)	
Length of stay (Mean, S.D)	5.37 (7.0)	4.86 (6.7)	3.69 (3.7)	<0.01
Elixhauser index (Mean, S.D)	1.98 (1.8)	2.44 (1.8)	2.95 (1.7)	<0.01
DRG weight (Mean, S.D)	2.11 (2.1)	2.41 (2.3)	1.82(1.4)	<0.01

[*] We did not have access to data that would confirm whether individuals are dual eligible beneficiaries

Table 2:

Patient-reported post-discharge issues by age group (adjusted)[*]

Patient reported post-discharge issue	Predicted probability			Average marginal effect of age on outcome (95% CI	
	64 years	65–84 years	85 years	64 years to 65–85 years	64 years to 85 years
Questions about discharge instructions on how to self-care at home	6.8%	7.1%	5.4%	0.04 (−0.99 to 1.66)	−1.42 (−3.76 to 0.92)
Required help getting new prescriptions	6.1%	5.7%	5.4%	−0.04 (−1.86 to 0.96)	−0.07 (−3.36 to 1.86)
Questions or concerns related to medications	10.0%	11.1%	9.8%	1.09 (−0.53 to 2.73)	−0.26 (−3.36 to 2.83)
Questions about follow-up care plan or assistance scheduling appointments/home visits	11.9%	14.0%	19.0%	2.08 (0.27 to 3.89)	7.03 (2.74 to 11.32)
Reported new or worsening symptoms since leaving the hospital	12.6%	11.7%	12.9%	−0.87 (−2.54 to 0.77)	0.24 (−3.16 to 3.65)
Questions about any other clinical issue related to hospitalization	12.9%	13.4%	11.2%	0.53 (−1.26 to 2.32)	−1.65 (−4.97 to 1.67)

[*] Categories are mutually exclusive, hierarchical, and modeled using an ordered logistic model. Predicted probabilities from the adjusted model are presented. All models were adjusted for the following confounders: gender, race, ethnicity, marital status, insurance, discharging service, Elixhauser score, discharge disposition, length of stay. Group p .value <0.001. AME in relation to reference category of 64 years.