

Prioritized Post-Discharge Telephonic Outreach Reduces Hospital Readmissions for Select High-Risk Patients

L. Doug Melton, PhD, MPH; Charles Foreman, MD; Eileen Scott, RN; Matthew McGinnis, BS; and Michael Cousins, PhD

Objectives: To determine if post-discharge telephonic case management (CM) reduces emergent hospital readmissions for select high-risk patients.

Study Design: Prospective, randomized.

Methods: We conducted a prospective, randomized control study of the effect of hospital discharge planning from health plan telephonic case managers on readmissions for high-risk patients. High risk was defined as having an initial discharge major diagnosis of gastrointestinal, heart, or lower respiratory and length of stay of 3 days or more. The intervention group (N = 1994) received telephonic outreach and engagement within 24 hours of discharge and their calls were made in descending risk order to engage the highest risk first. The control group (N = 1994) received delayed telephonic outreach and engagement 48 hours after discharge notification and no call order by risk was applied. Comparison groups had statistically equivalent characteristics at baseline ($P > .05$).

Results: The intent-to-treat 60-day readmission rate for the treatment group was 7.4% versus 9.6% for the control group ($P = .01$), representing a 22% relative reduction in all-cause readmissions. Two post hoc assessments were conducted to identify potential mechanisms of action for this effect and showed that the treatment group had more physician visits and prescription drug fills following initial discharge.

Conclusions: Telephonic CM reduces the likelihood of 60-day readmissions for select high-risk patients. This study suggests that prioritizing telephonic outreach to a select group of high-risk patients based on their discharge date and risk severity is an effective case management strategy. Future studies should explore patients' activity beyond phone calls to further explain the mechanism for readmission reduction.

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For author information and disclosures, see end of text.

Readmissions make up a significant portion of healthcare expenditures and account for 30% of total inpatient cost in the commercial population.¹ The Agency for Healthcare Research and Quality stated that roughly 1 in 10 readmissions in 2008 could have been prevented if acute conditions were managed properly post discharge.²

Prior published studies testing the impact of post-discharge outreach on readmission reductions have shown success with select interventions such as Telehealth video consultations with an in-person health practitioner³ and house calls.^{4,5} In comparison, the evidence is mixed for the effectiveness of case management (CM) that is not in person.⁶⁻⁸ Riegel and colleagues tested the effect of telephonic CM for heart failure patients' resource use and found the intervention group had 36% lower heart failure readmissions at 3 months than controls ($P < .05$). In contrast, Laramee tested the effect of telephonic CM paired with early discharge planning for congestive heart failure patients on readmission, but found 90-day readmission rates were equal for the CM and usual care groups. Neither of these studies focused solely on the impact of CM on the commercially insured. To date, there is only 1 published prospective, stratified randomized study assessing the impact of telephonic CM on readmissions within a large, commercially insured population, and it showed a 10% readmission reduction.⁹

The study objective was to determine if a telephonic CM patient-prioritization protocol for recently discharged high-risk patients with select acute conditions reduced all-cause readmissions. We conducted a prospective, stratified randomized study to test the effectiveness of prioritized telephonic CM within a large, commercially insured population. This is the second study to assess a telephonic CM readmission reduction intervention on a large, commercially insured population.⁹

METHODS

Population

All study patients had active private health insurance coverage from the same carrier and were eligible for the same carrier's CM during the study period between July 1, 2010, and December 31, 2010. All study patients had a 3-day or greater length of stay and an *International Classification of Diseases, Ninth Revision, Clinical Modification* (ICD-9-CM) major diagnosis of Heart/

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Circulatory (ICD-9-CM Major Group CD = 12), Lower Respiratory (ICD-9-CM Major Group CD = 11), or Gastrointestinal (ICD-9-CM Major Group CD = 13) at initial discharge. All major diagnoses were considered, but the 3 major diagnosis categories and 3-day or more length of stay were the inclusion criteria because a previous internal retrospective study revealed those characteristics were most associated with 30-day and 60-day readmissions.¹⁰ Discharges were from all 50 states except for Texas and California because those states had existing readmission reduction pilots during the study.

Study Design

The intervention group was labeled as the prioritized group. The prioritized group received 2 attempted post-discharge phone calls by a case manager within 24 hours of discharge notification. If the prioritized patient was not contacted within 24 hours, then a second attempted call occurred the following day. All attempted calls to the prioritized group were made in descending health risk order (as defined by the Episodic Risk Group [ERG] score) so that outreach was first administered to patients with the greatest likelihood of readmission due to poorer health status. The control group was labeled as the unprioritized group. The unprioritized group received an attempted call by a case manager 3 days after discharge and the unprioritized group calls were not made in any health risk order. If the unprioritized patient was not contacted on day 3, then a second attempted call occurred the following day. If after multiple calls the patient was still not contacted, an Unable to Contact letter was mailed to the patient stating the contact attempts and to return a call.

We created a Call List Flow Chart using 3 days of discharges (ie, 1/3/11 to 1/15/11) to demonstrate the prioritization logic overtime for patients contacted and not contacted (eAppendix A, available at www.ajmc.com). The prioritized patients represent the first half of the call order list receiving initial phone calls in descending risk order within 1 day of discharge, whereas the unprioritized patients represent the second half of the call order list receiving their initial phone call 3 days after discharge and these calls were made in no risk order. One long list was created daily to make the CMs unaware of patient assignment. To further preserve the blinding, 2 CMs for telephonic outreach were scheduled from 8 AM to 5 PM and then 2 different CMs between 5 PM and 9 PM. A total of 86 designated case managers supported the pilot.

Take-Away Points

The described prioritization experiment reveals an evidence-based post-discharge case management strategy for reducing the likelihood of readmissions for select high-risk patients. Of specific interest:

- Healthcare organizations providing post-discharge services via telephonic case management to select high-risk patients with diagnoses related to heart, gastrointestinal, and lower respiratory can use findings to assist with strategic outreach prioritization.
- In future readmission pilots, the health management community is encouraged to adopt post-discharge strategies aimed at increasing telephonic participation, since this study concludes that higher rates of initial post-discharge telephonic engagement can reduce readmissions in select high-risk patients.

The same post-discharge telephonic script (eAppendix B) was provided to the comparison groups. The script's questions focused on 3 areas: (1) post-discharge understanding of medication, (2) post-discharge care management orders, and (3) scheduling of follow-up visits. An engaged conversation was defined as CM receiving a response to every question. CM phone calls resulting in an unanswered call, voice mail, dropped call, or partial completion of the scripted questions were classified as not engaged. We assumed most participants had an active phone number since the field is a part of annual enrollment information.

Stratified randomization design created comparable prioritized and unprioritized groups at baseline. A daily list of eligible patients discharged from the previous day was produced by utilization managers and called a Census Discharge File. The Census Discharge File contained discharge-related information (ie, dates, diagnosis, procedure codes, etc) describing the inpatient episode and we confirmed that Census Discharge File information was consistent with data in paid claims 90 days later. Our stratified randomization logic assigned study subjects into 1 of several strata defined by a combination of the following variables: gender, ERG score, major ICD-9-CM diagnostic group, count of prior 12-month admissions, health insurance plan type, and hospital facility. Within each stratum, patients were randomly assigned to either the prioritized or unprioritized group. Under this randomization protocol we prospectively matched patients one-to-one on gender, risk score, major diagnostic group, recent admissions history, plan type, and discharge hospital. The matching variables were selected because previous studies showed they were strong predictors of readmissions.^{5,11-13}

Outcomes Studied

The primary outcome was the percent of unique urgent emergent readmissions at 30 days and 60 days. The secondary outcome was readmission rates per 1000. Urgent emergent readmissions were defined as all-cause unscheduled admissions following the initial discharge. We explored measuring clinically related readmissions, but decided against it because

secondary claims did not provide the level of clinical detail needed for appropriate measurement, such as chart abstraction information. All outcomes are derived from insurance claims data and CM utilization data including facility, professional, pharmaceutical, and CM call activity.

Statistical Analyses

A group proportions power calculation determined needed sample size. We hypothesized that the intervention would yield a 2% to 3% difference in readmissions between the comparison groups based on the results of a prior internal retrospective analysis.¹⁰ Using the power calculation inputs of power 0.80 and a 2-sided *P* value of .05, the estimated sample size was 3988. We aimed for a cohort of 4786 to account for the 15% to 17% of patients likely to be excluded because of having no comparable match, inactive coverage, or mortality. Baseline demographics and readmission outcomes were analyzed by χ^2 tests for discrete variables, 1-way analysis of variance for normally distributed continuous variables, and the Wilcoxon and Mann-Whitney test for skewed distribution of continuous variables. For all statistical analyses, alpha was set to 0.05 and SAS software version 9.1 was used (SAS Institute Inc, Cary, North Carolina). All reported readmission results used intent-to-treat estimation.

Post Hoc Assessments

Three retrospective post hoc assessments further assessed the relationship between the intervention and outcomes. Each post hoc assessment used one-to-one retrospective matched case control without replacement to control for bias due to non-random assignment of the newly created post hoc comparison groups formed from within the original data set. The groups were retrospectively matched on key demographics and were statistically indistinguishable (*P* > .05) at baseline by age, gender, ERG score, major diagnosis at initial discharge, 12-month admission history, and plan type.

The first post hoc assessment explored the readmission trend of the second control group. The second control group consisted of patients eligible for the pilot that were not randomly assigned to the prioritized or unprioritized group because they had no comparable match when first entering the pilot (*N* = 521). The second control group was outreached to the same as the first control group. We postulated that the readmission trend of the second control group should be similar to the unprioritized group since both groups did not receive the prioritization outreach intervention.

The second assessment examined the rates of outpatient physician visits and prescription drug fills within 30 days post discharge between the comparison groups. The hypothesis was that patients in the prioritized group, who experienced a lower rate of readmissions, would have a higher rate of pre-

scriptions filled as well as outpatient visits, prompted by more expedient follow-up calls.

The third assessment explored whether the readmission results impacted total medical cost (TMC). TMC was defined as the sum of eligible charge amounts for inpatient, outpatient, professional, and facility claims. To measure the change in TMC consistent with the 60-day readmission results, we captured TMC 60 days prior to, and 60 days after, the initial discharge. To minimize the effect outliers we capped the 4% of participants with TMC greater than \$100,000.00 at \$100,000.00. We used a difference-in-differences regression model to test the impact on the change in TMC between the 2 comparisons groups pre- and post-intervention.

RESULTS

Baseline Characteristics and Post-Discharge Intervention

We identified 4807 patients eligible for the study. Of those identified, 298 were excluded because of inactive healthcare coverage and 521 were excluded after randomization because they did not have a comparable match. The **Table** shows the baseline characteristics of the 3988 randomly matched patients in the study (1994 prioritized and 1994 unprioritized). After random assignment, the comparison groups had similar distributions by gender, age, inpatient history, discharge diagnosis, chronic conditions, and health plan type. No single hospital made up a disproportionate number of discharges. The ERG scores were used to obtain an aggregate measure of patients' health risk and the risk distribution was at baseline. All statistical tests confirmed no statistically significant differences between the 2 groups following randomization.

The intervention group had a telephonic post-discharge CM conversation 5 days earlier on average than the control group (*P* < .05), and this was the only observed difference between the comparison groups (Table). 44% of the prioritized patients had an engaged telephonic conversation with a case manager and 35% of the unprioritized had an engaged telephonic conversation with a case manager. The prioritized group was contacted on average 10 days after discharge (18 standard deviation [SD] and 5 days median). The unprioritized were contacted on average 15 days after discharge (26 SD and 6 days median). The non-parametric test showed the time to contact was statistically different between the groups (*P* < .05), confirming that the prioritized group was contacted significantly earlier than the unprioritized (**Figure 1**). CM consultation was provided at every initial call, hence our focus on the days to first contact as the primary time measure for the application of the intervention, instead of the time between calls for patients with multiple calls. Of those contacted, the average count of telephonic

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Table. Baseline Characteristics of Readmission Reduction Pilot Production

Demographics	Prioritized (n = 1994)		Unprioritized (n = 1994)		P
	Mean (SD)	Median	Mean (SD)	Median	
Male	52%		52%		1.00
Age	50 (16)	54	49 (16)	53	.08
Retrospective ERG risk score	15 (7)	16	15 (7)	16	.42
Had a prior admission within 12 months	26%		26%		1.00
Number of prior admissions within 12 months	0.53 (1.3)	0	0.50 (1.2)	0.0	.94
Enrolled in PPO	71%		71%		1.00
Enrolled in flex plan	17%		17%		1.00
Other plan type (indemnity, HMO, POS)	12%		12%		1.00
Chronic Conditions					
Coronary heart disease	19%		19%		.98
Diabetes	18%		17%		.45
Low back pain	15%		15%		.97
Weight complications	15%		15%		.95
Asthma	13%		12%		.39
Hospitals Representing Top 3% of Initial Discharges					
Methodist Germantown, TN, discharges	2%		2%		1.00
St. Francis, FL, discharges	1%		1%		1.00
Orlando Hospital, FL, discharges	1%		1%		1.00
Diagnosis at Initial Discharge					
% Lower respiratory	17%		17%		1.00
% Heart/circulatory	37%		37%		1.00
% Gastrointestinal	44%		44%		1.00
% Endocrine	1%		1%		1.00
% Skin	<1%		<1%		1.00
Application of Intervention					
Percent contacted by case manager ^a	44%		35%		<.01
Days to post-discharge contact ^a	10 (18)	5	15 (26)	6	<.01

^aAll differences were statistically insignificant at $P > .05$, except for percent contacted and average days to contact by a case manager. ERG indicates episode risk group; flex, flexible spending account; HMO, health maintenance organization; POS, point-of-service plan; PPO, preferred provider organization; SD, standard deviation.

contacts was 1.83 (SD = 2) in the prioritized group and 1.81 (SD = 1) in the unprioritized group, which is the outreach frequency hypothesized since the intervention was not designed to influence the count of calls needed to close care gaps. From an identification perspective, there was no difference in the number of days between discharge date to health plan discharge notification between the prioritized and unprioritized groups. We confirmed that no clinical or key demographic factors existed between the 2 telephonic engaged populations, to ensure that outcomes were not explained by differences in characteristics.

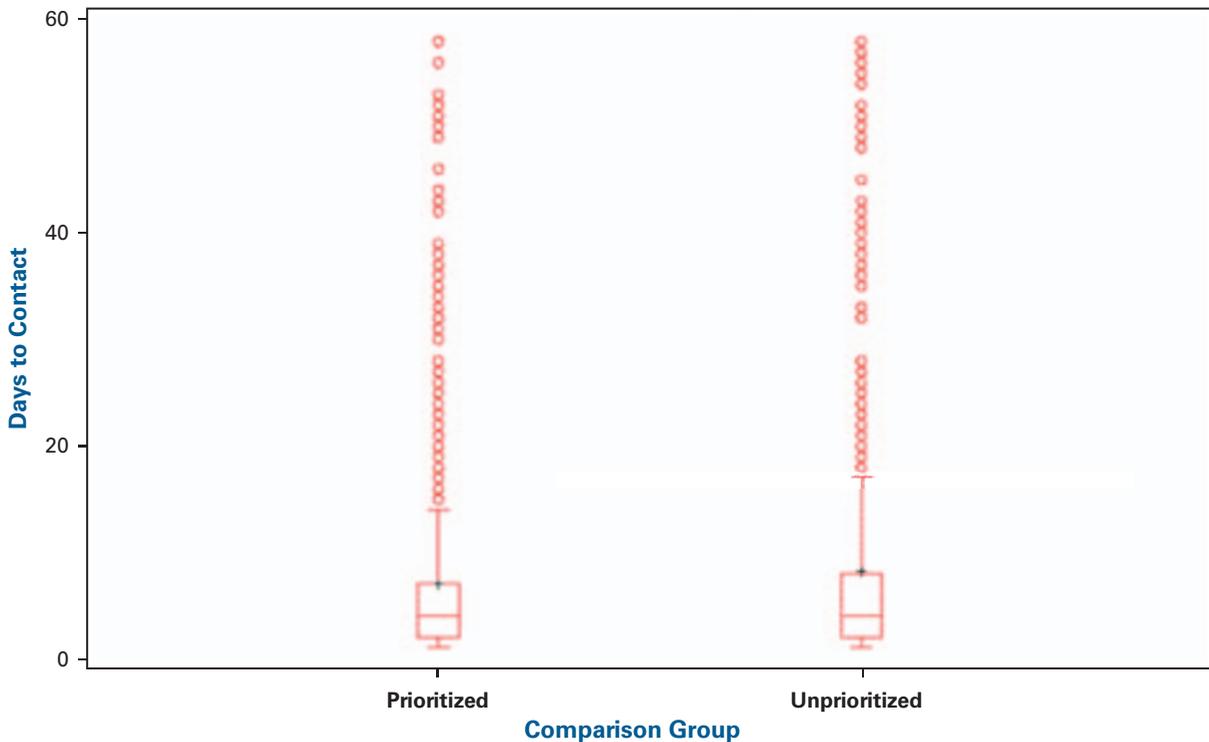
RESULTS

The 30-day intent-to-treat all-cause readmission results for the prioritized treatment group was 5.7% versus 7.3%

for the unprioritized control group ($P < .05$). The 60-day all-cause readmission rate for the treatment group was 7.5% versus 9.6% for the control group ($P < .05$) (Figure 2). The readmit rate per 1000 was lower by 6% and 12% in the prioritized group, but was only statistically significant for the 60-day result (30-day was 158 per 1000 among prioritized vs 169 per 1000 among unprioritized; $P > .05$) (60-day was 230 per 1000 among prioritized vs 261 per 1000 among unprioritized; $P < .005$) (Figure 3).

For the first post hoc assessment we postulated that the re-admission trend of the second control group would be similar to the unprioritized group (the first control group). The retrospectively matched second control group (N = 456 out of 521) was contacted on average 13 days post discharge (14 SD and 6-day median) and the matched first control group (N = 456

■ **Figure 1.** Plotted Distribution of Time to Contact Between Prioritized (n = 877) and Unprioritized Groups (n = 698)



out of 1994) was contacted on average 14 days post discharge (26 SD and 6-day median). The intent-to-treat readmission result at 30 days was 7.9% for the second control group and 7.5% for the first control group ($P > .05$), and at 60 days was 10.1% second control and 9.6% first control group ($P > .05$). The first post hoc results illustrate consistency in the readmission trend between the 2 non-intervention groups. This finding adds further credence to the main conclusion that prioritizing CM outreach to patients in descending health risk order within 24 hours of discharge is more effective than using no health risk prioritization when calling patients 3 days or later post discharge.

The second assessment examined the rates of office visits and drug fills within 30 days post discharge between the comparison groups. The prioritized group (N = 1994) had a small but statistically significantly higher percent of outpatient visits (85.0% vs 81.1%; $P < .05$) and prescription drug fills (72.9% vs 70.0%; $P < .05$) than the unprioritized group (N = 1994). The second assessment suggests a portion of the mechanism of action for the readmission reduction effect may be due to higher use of office visits and drug fills.

The third assessment examined the change in short-term total medical cost (TMC). The Difference-in-Difference result showed the prioritized group had a \$1163 lower average change in TMC relative to the TMC change in the unprioritized group (standard error [SE] = 1386; $P = .40$). When focusing solely on

total inpatient cost (TIC) per hospital day, results show the prioritized group had a \$564 lower average change in TIC per hospital day relative to the unprioritized group (SE = 287; $P = .04$). Although the TMC change was statistically insignificant, the statistically significant difference in TIC is helpful for understanding the area within TMC where cost reduction occurred.

CONCLUSIONS

Our study suggests that prioritized outreach may be one method for reducing the likelihood of a readmission, and a portion of the mechanism of action for this effect is to increase physician visits and prescription drug fills. Physician visits and prescription drug fills are the measurable mechanisms linking post-discharge activity to readmission reduction, but there are other unobserved mechanisms for this causal link that should be considered. For example, telephonic CM encourages the adoption of self-improvement skills and therefore a change in patients' intrinsic motivation for a healthier lifestyle could be one alternative mechanism linked to readmission reduction. Additionally, previous studies¹⁴ document the fact that lack of adherence to medication is commonly associated with readmissions and therefore medication adherence, a variable we couldn't measure through claims, is another alternative explanation to consider when linking the intervention to a readmission reduction.

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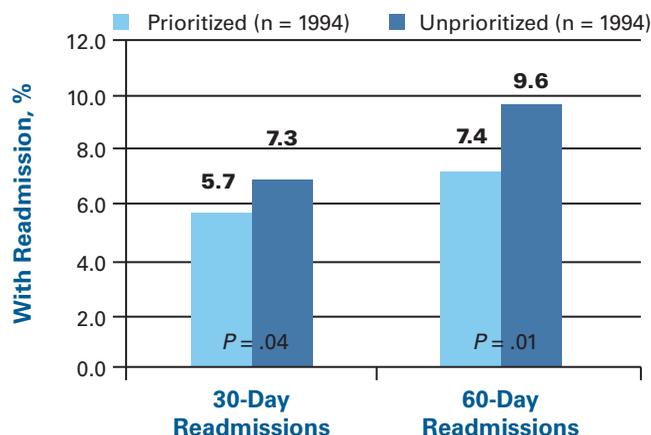
A recent randomized trial assessing the effect of telephone-based CM on hospital utilization showed the enhanced-supported telephonic intervention group had a 10% reduction in admission for patients with diagnosis similar to our study.⁸ Wennberg and colleagues' study and our study use a similar evaluation approach of prospectively creating a usual-care group as a comparison with the intervention group. Our study is different from Wennberg's because of the focus on the CM outreach coupled with the prioritization of outreach by health risk status. The impact of time to follow-up office visits has shown similar results,^{11,15} further supporting the message that the sooner the patient is engaged with an in-office provider, the more the likelihood of their readmission can be reduced. Similar to Wennberg's research, Reigel's study is another recent RCT assessing the impact of telephonic outreach, but they find a less generous reduction in readmissions with a more intense intervention (ie, average 17 outreach calls). The plausible differences in Reigel's results relative to ours are arguably due to distinct demographic differences, including our study having a 20-year younger sample and including no patients or hospitals from the state of California.

The lesson learned from this experiment is that the timing of receiving the readmission intervention to targeted high-risk patients is critical. Healthcare organizations providing post-discharge telephonic outreach to patients with diagnoses related to heart, gastrointestinal, and lower respiratory can use these findings to inform realignment of CM resources. Although use of transitional care models continues to rise within hospitals and among commercial disease-management companies, telephonic outreach is still one of the most frequently used outreach modalities for the commercially insured.¹⁶ To better clarify the relationship between telephonic outreach and readmission reductions, future comparative effectiveness studies should retest the prioritization intervention against all major diagnoses to confirm that this approach impacts a wider profile of patients. To achieve optimal patient engagement, practitioners should adopt strategies empirically shown to increase participation.

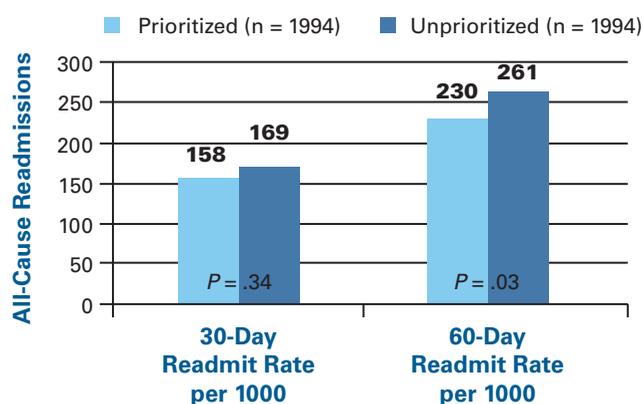
Limitations

One of the limitations of the study was the inability to adjust for prior CM activity or increase current engagement. There was no systematic way to identify patients' prior or current CM activity outside of that provided by the carrier. Also, there were unobserved environmental factors (ie, hospital quality, bed availability) for which we were unable to control. However, by prospectively matching patients discharged from the same hospital, we were able to minimize bias due

■ **Figure 2. Intent-to-Treat Results**



■ **Figure 3. Readmission Rate Comparisons**



to variation in hospital practice patterns and markets. Regarding generalizability, the impact of our intervention on patients discharged with major diagnoses outside of heart/circulatory, gastrointestinal, and lower respiratory system should be further explored. Office visits and drug fills that occurred within 30 days of initial discharge were reported, but we did not determine if the office visit or drug fill was related to care at initial discharge. Lastly, we argue total medical cost reductions were not captured by our investigation because 60-day observation provides a limited period for total cost change. However, previously similar readmission pilots suggest total medical cost reductions can occur at the 1-year mark.⁹

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Affiliations: From CIGNA HealthCare, Raleigh, NC (LDM, MM, MC), Chattanooga, TN (CF), Phoenix, AZ (ES).

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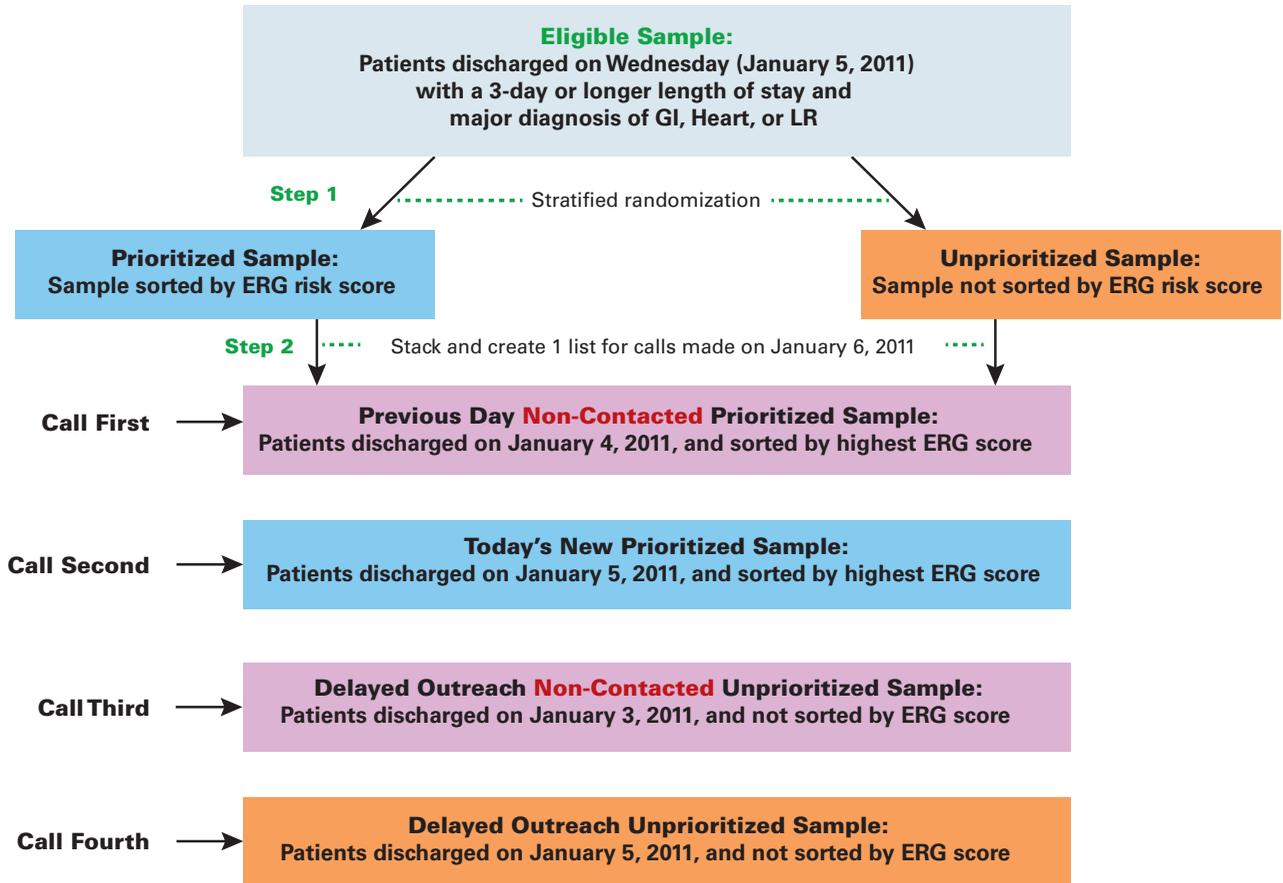
Address correspondence to: L. Doug Melton, PhD, MPH, 701 Corporate Center Dr, Raleigh, NC 27607. E-mail: Larry.Melton@CIGNA.com.

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■ **eAppendix A.** Flow Chart Describing Creation of Case Manager Call List (assume list was created on Thursday, January 6, 2011, for case managers calling patients discharged January 5, 2011, and earlier)



ERG indicates episodic risk group; GI, gastrointestinal; LR, lower respiratory.

■ **eAppendix B. Short-Term Outreach Assessment Tool**

1. Health Status: Summary of current health status, including the reason for the recent hospitalization

2. Medical History: Summary of comorbidities and any past procedures and/or treatments

3. Medications

- A. What medications (including prescription and over-the-counter medications) are you (or is—*customer name*—taking)? Tell me how and when you take them.
- B. What medications have been prescribed and have not been filled yet?
- C. Are you (or is—*customer name*—) allergic to anything? If yes, list and document.
- D. Where are the prescriptions filled?
- E. Review Pharmacy Benefits with patient.
- F. Describe education provided/interventions related to medications (per research found during Healthwise search, Document Medication Possession Ratio, and any actions of <80%.

4. Medical Knowledge & Motivation

- A. Do you ever forget to take your medications?
- B. Are you careless at times about when you take your medications?
- C. Sometimes do you forget to fill your prescription on time?
- D. When you feel better do you sometimes stop taking your medications?
- E. Sometimes if you feel worse when you take your medicine, do you stop taking it?
- F. Do you know the long-term benefit of taking your medicine as told to you by your doctor?
- G. Intervention(s) (Medication Motivation & Knowledge)

5. Provider & Health Services Information

- A. Which doctor(s) are you (or is—*customer name*—) going to currently? Please tell me the phone number(s). When is next appointment scheduled (for each doctor)? Include doctor name(s), phone number(s) & next scheduled appointment.
- B. Is the customer receiving any Home Health and/or DME services?
- C. Home Health/DME Services Contact Information—Names, phone numbers
- D. Are there any services (including transition of care or continuity of care) or equipment needed?
- E. Services or equipment needs
- F. Describe education provided related to home health and/or DME services.

6. Pain Assessment

- A. Pain Assessment: Location, Frequency, Intensity 1-10.
- B. Describe education provided/interventions related to pain.

7. Gastrointestinal Assessment

- A. List of GI Issues
- B. Describe education provided/interventions related to gastrointestinal status.

8. Functional & Cognitive Assessment

- A. Functional Current Deficits (list)
- B. Current Cognitive Deficits (list)
- C. Is a caregiver needed to meet functional and/or cognitive needs?
- D. Describe involvement of caregiver to meet functional and/or cognitive needs.
- E. Describe education provided/interventions related to functional/cognitive status.

9. Stress Screening

- A. Currently, how would you rate your level of stress? Rate 1-10.
- B. How would you rate your ability to cope with your current level of stress?
- C. Is this something for which you would like help?
- D. Intervention(s)

10. Depression Screening

- A. Over the past 2 weeks how often did you feel little interest or pleasure in doing things?
- B. Over the past 2 weeks how often have you felt down, depressed, or hopeless?
- C. PHQ-2 Score
- D. Probability of major depressive disorder
- E. Probability of any depressive disorder
- F. Is this something with which you would like help?
- G. Intervention(s)

11. Treatment Plan

- A. Sick Day/Self Management Plan
- B. Customer educated on Self Management Plan brochure and encouraged to discuss with physician on next visit
- C. If Plan is in place, does customer have a list of medications, dosage, & frequency? Does customer know what times to take them?
- D. If Plan is in place, does customer know when to call the physician & what symptoms to be of concern?
- E. What to do if physician is unavailable?
- F. If Plan is in place, does the customer have the medication list, the physician name, and phone number available for caregiver?
- G. Describe any gaps in treatment plan noted above, the education provided, and interventions related to the treatment plan.

12. Education/Community Resources:

- A. List any additional sources/references used or given to customer/authorized representative (that have not already been addressed in a previous section).
- B. Describe education provided/interventions related to benefit plan/benefit limitations
- C. Are you (or is—*customer name*—) currently enrolled in or have you ever been enrolled in a disease management or wellness program?
Note: If customer not enrolled in a disease management or wellness program and you feel he/she could benefit from a referral to a program, please check eligibility and benefits and refer as appropriate.
- D. Customer/authorized representative verbalized understanding of all education provided.

13. Additional Notes

14. Next Follow-up Outreach Call

- A. Appointment date for follow-up with customer
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