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Impact of a community pharmacy transitions of care program on 30-day readmission rates

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Abstract

Objectives—The primary objective of this study was to evaluate the impact of a Transitions of Care (TOC) program on both all-cause and related 30-day hospital readmission. The secondary objective was to evaluate which patient-specific factors, if any, are predictive of 30-day hospital readmission.

Design, setting and participants—A transitions of care program in an outpatient pharmacy, driven primarily by student pharmacists, provided telephonic counseling to recently discharged patients. The calls were conducted within two to seven days post discharge, and focused on medication counseling and reconciliation, as well as promotion of a physician follow up visit. The goal of this program was to decrease hospital readmissions among patients discharged with a cardiovascular-related diagnosis. Patient specific information was recorded in a spreadsheet, including discharge diagnosis, and readmission diagnosis for those who returned to an inpatient facility within 30 days. This study was a retrospective chart review. Data was manually extracted from the program's data spreadsheet and the institution's electronic medical record for patients referred to the transitions of care program from June through November 2017. Patients discharged to hospice, prison, or a long-term care facility were excluded from analysis. Researchers collected information on patient demographics, diagnoses and readmissions. Data analyses were performed using SAS 9.4.

Outcome measures—The primary outcome measure was 30-day all-cause readmission and the secondary measure was 30-day related readmission.

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Conflicts of interest: Currently Melissa Morano is the Supervising Pharmacist for High Street Prescription Center, a Kaleida Health employee (at the time of the study she was a staff pharmacist for High Street Prescription Center); currently Jill Pogodzinski is the Director of Community Based Services for the VNA, a Kaleida Health employee (at the time of the study she was the Family Pharmaceutical Services Manager and Supervising Pharmacist for High Street Prescription Center). All other authors report no conflicts of interest.

Results—1,219 encounters were examined. Compared to those patients without TOC participation, those who did utilize the TOC program had a 67% decreased odds of all cause 30-day readmission (OR 0.33; 95% CI 0.22, 0.48; $p<0.0001$) and a 62% decreased odds of a related readmission (OR 0.38; 95% CI 0.18, 0.82; $p=0.008$).

Conclusion—Community pharmacists and Advanced Pharmacy Practice Experience (APPE)-level student pharmacists have the potential to make a significant impact on reducing hospital readmission rates.

Background

In the United States, over 35 million people are admitted to the hospital each year.¹ Approximately 20% of Medicare patients are unexpectedly readmitted within 30 days of hospital discharge, amounting to a cost of \$41.3 billion in fiscal year 2011.^{2,3} Operating since 2012, the Hospital Readmissions Reduction Program, created by the Patient Protection and Affordable Care Act (PPACA) of 2010, permits reduced payments to hospitals with excess readmission rates (ERR) in one of six categories: acute myocardial infarction, heart failure, pneumonia, chronic obstructive pulmonary disease, coronary artery bypass grafts, and elective primary total hip or knee arthroplasties. This legislation has reinforced the need for development and expansion of Transition of Care (TOC) programs, which work to reduce readmissions and enhance patient outcomes.

Research has revealed that after patient discharge, inclusion of clinical pharmacists amongst multiple system-wide interventions helps dramatically reduce readmission rates.⁴ Following discharge from the hospital, adverse events are most frequently medication related, with non-adherence at the forefront of major episodes and readmission.^{5,6} Studies have acknowledged that proper medication management is imperative to an effective discharge transition of care plan.⁷ Early programs created in response to medication management were designed through a combination of discharge nursing education, and pharmacist follow-up phone calls. A widely-used model for transitions of care is the Care Transitions Intervention (CTI). Developed by Dr. Eric Coleman at the University of Colorado, this program consists of coordinating with a Transitions Coach who meets with the patient in the hospital and then follows up with home visits and/or phone calls up to 4 weeks after discharge.⁸ The model focuses on 4 key intervention areas: medication management, scheduling follow-up care, recognizing “red flags” that could indicate worsening conditions, and taking ownership of health by using a personal health record.⁹ Consequently, a retrospective chart review focusing solely on pharmacist interventions was similarly able to produce evidence that unplanned hospital readmissions or ED visit rates could be decreased independently from nursing intervention.¹⁰ Multiple studies have additionally established that the involvement of a clinical pharmacist in the transitions of care process can have an impact on reduced hospital readmissions when their services are utilized as part of an intensive intervention for both acute and chronically ill patients.^{10–12}

Objectives

The primary objective of this study is to evaluate the impact of the TOC program on both allcause and related 30-day hospital readmission. The secondary objective was to evaluate which patient-specific factors, if any, are predictive of 30-day hospital readmission.

Methods

Study design, setting and population

This study was a retrospective records review conducted from data collected by High Street Prescription Center's TOC program. High Street Prescription Center is the outpatient pharmacy located within Buffalo General Medical Center, a 457-bed academic medical center in an urban setting located in downtown Buffalo, New York. The transitions of care program developed from a "meds to beds" initiative at High Street Prescription Center, known as Prescriptions Plus. When patients opt-in to the Prescriptions Plus program they are provided with a 30-day medication supply and medication counseling at the bedside prior to discharge from Buffalo General Medical Center. The TOC program was developed to add an additional layer of patient care to the Prescriptions Plus program with the goal of reducing 30-day readmission rates. In our study, Advanced Pharmacy Practice Experience (APPE)-level student pharmacists contacted patients to provide an intervention aimed at decreasing hospital readmissions. The intervention under evaluation consists of a telephonic consultation to assess adherence, perform medication reconciliation, counsel on medication regimens and adverse effects, and optimize pharmaceutical care through collaboration with providers. This communication occurred 2–7 days post discharge. Patients were additionally prompted to schedule and attend post-hospitalization follow-up appointments as recommended in their discharge paperwork. The importance of these appointments, as well as medication use and adherence, was thoroughly stressed through each exchange, with the purpose of preventing a potential readmission. A TOC pharmacist was available to answer questions or concerns raised by APPE-level student pharmacists as well as to facilitate learning and provide feedback. The authors hypothesize that those patients receiving the intervention would have decreased odds of both 30-day readmission and 30-day related readmission compared with those who did not receive the intervention.

Buffalo General Medical Center and Gates Vascular Institute are nationally known for their cardiovascular services, including certification and accreditation as a Comprehensive Stroke Center by the Det Norske Veritas Germanischer Lloyd (DNV GL). Subsequently, a large portion of discharge prescriptions filled at High Street Prescription Center fall under the cardiovascular scope. It was postulated that targeting these conditions would prove beneficial in transitions of care communications, as there was plentiful opportunity to make a major impact for these individuals. These disease states would grant a sufficient patient population, without overwhelming the limited manpower available to perform the calls (i.e. there were only 1–3 APPE students at any given time making the follow-up phone calls). Additionally, cardiovascular entities were chosen as the main priority, as patients are frequently unaware of the significance of medication adherence and symptom management given the symptomatology is generally silent.

Patients were referred to the TOC program from the Prescriptions Plus Program if they were adults aged 18 years, with a discharge diagnosis of acute myocardial infarction, heart failure, atrial fibrillation/flutter, coronary artery disease, stroke, coronary artery bypass graft, pulmonary embolism, deep vein thrombosis, or related vascular conditions. Also included were those discharged on narrow therapeutic index medications, including dual antiplatelet therapy, anticoagulants, and antiarrhythmics. Patients referred to the TOC program from June 2017 through November 2017 were included in the data analysis; patient information from December 2017 was used to ascertain 30-day readmission status of November 2017 patients. Each patient's medical record and their information as found in the program's data spreadsheet was evaluated by more than one individual and discrepancies were adjudicated. Patients were excluded from analysis if they were part of the prison population, discharged with hospice care, or discharged to a long term care or assisted living facility. To the knowledge of the authors there were no other transitional care initiatives taking place at this facility during the study period.

Covariates

The following patient-level characteristics were included in the analysis: age, gender, race, prescription insurance coverage, whether follow-up appointments had been made, TOC program participation, length of telephone call, discharge diagnosis, readmission within 30 days of initial discharge, and readmission diagnosis. In order to account for possible variability in patient complexity between groups the following characteristics were also included in the analysis: length of stay (LOS) of index admission, acuity of admission (which speaks to whether the visit was planned or not), Charlson Comorbidity Index (CCI), number of emergency department (ED) visits in the six months prior to the index admission, and number of medications at discharge. Race was categorized as white, black and other. The other category included Asian, Pacific Islander, mixed-race, and unreported race; these categories were combined into one (other) due to small cell size for any one category. For the purposes of logistic regression, only black and white were compared while producing odds ratios due to the small cell size of other in comparison to white and black. Prescription coverage was defined as government funded, private or none. Length of telephone call was recorded in minutes at the time of counseling. Discharge diagnosis was compared to readmission diagnosis to determine if the readmission was for a reason related to the initial discharge. A clinically related readmission was determined by comparing the discharge diagnosis to the readmission diagnosis. A related diagnosis was one that could be reasonably linked to the index discharge diagnosis. For instance, a readmission due to shortness of breath or heart failure would be considered a related readmission for a patient with an index admission for heart failure exacerbation, but a readmission for a fracture would not be considered related. TOC program participation was defined as a conversation involving education, counseling, and inquiry into status of follow-up appointments. Only one phone conversation was necessary to qualify a patient as having participated. All patient-specific information was ascertained through examination of the electronic medical record.

Data analysis

A power and sample size analysis was performed to ensure enough patient encounters occurred during the study timeframe to enable capture of a 5% difference between groups

for the primary outcome. Given a population of 13,482 from which to sample and a desire for 80% power, it was determined that 393 was the minimum group size. Patient-specific data was characterized through descriptive analyses including: a bivariate analysis of association among the dependent and comparison variables. Patients were grouped according to whether they had participated in the TOC program and those that did not served as a reference group. Bivariate analysis of both continuous and categorical data was performed *t* and chi-square, respectively. A binomial logistic regression model was used to examine the association between patient-level characteristics and hospital readmission (both all-cause and related). TOC program participation was used as one of the primary independent variables of interest. For each independent variable an odds ratio (OR) and 95% confidence interval was computed. Statistical significance was assessed at an *a priori* α -level of 0.05. All analyses were two-sided and conducted using SAS Version 9.4 (SAS Institute, Cary, NC). This study received approval from the Institutional Review Board of the State University of New York at Buffalo. This research did not receive any grant funding from agencies in the public, commercial, or not-for-profit sectors.

Results

The Prescriptions Plus program filled prescriptions for 13,482 patients during the study period. After exclusion, the TOC program attempted to contact 1,219 patients from June to November of 2017; 780 of those patients participated in the TOC program (Figure 1). The remainder of patients (439) either could not be reached following three attempts or declined to participate. Baseline characteristics and readmission rates of the study population are presented in Table 1. Compared to patients who did not participate, those who did were slightly older (mean age 66 vs 62.5 years; $p<0.0001$) and more were white (81.15% vs 69.02%; $p<0.0001$). TOC program participants experienced less all-cause and related 30-day readmission 6.54% vs 16.86% ($p<0.0001$) and 3.59% vs 12.30% ($p=0.01$), respectively. The average length of telephone call was 3.75 minutes whereas the range was 1–40 minutes. The median LOS was 3 days. TOC program participants had a higher CCI compared to non-participants (4.9 and 4.4, $p<0.0001$). There was no significant difference in either LACE score or number of medications at discharge between groups ($p=0.24$ and 0.52, respectively).

Tables 2 and 3 present the results of the binomial logistic regression on 30-day all-cause and 30-day related hospital readmission, respectively. Compared to white participants, black patients were 118% more likely to be readmitted for any cause within 30 days of their initial discharge (OR 2.18; $p=0.0003$). Each minute of conversation was associated with 8% reduced odds of 30-day readmission patients were 8% less likely to be readmitted within 30 days (OR 0.92; $p=0.003$). Each point increase in CCI garnered a 14% increased odds of 30-day all-cause readmission (OR 1.14, $p=0.0002$). Those with a high risk LACE score (≥ 10) were 4.56 times more likely to be readmitted in 30 days. Each additional discharge medication produced a 4% increase in odds of 30-day readmission ($p=0.04$) and every additional ED visit in the prior 6 months increased odds of 30-day readmission by 31% (OR 1.31, $p<0.0001$). Compared to those without TOC program participation, those who participated were 65% less likely to be readmitted (OR 0.33; $p<0.0001$) when controlling for LOS, visit acuity, CCI, ED visits in the prior 6 months and number of medications at

discharge. Patients with private prescription coverage were 64% less likely to be readmitted for a diagnosis related to the initial discharge compared to those with no prescription insurance coverage (OR 0.36; $p=0.08$). In considering odds of 30-day related hospital readmission, those who participated had a 63% reduction in the odds of admission compared to those who did not participate (OR 0.38; $p=0.008$).

Discussion

Transitions of care is currently an extensive topic of conversation in the healthcare community. As with any new initiative, a major barrier at the forefront is the cost associated with implementing and maintaining these programs. When Prescriptions Plus launched in 2014, there were a number of associated costs, including increased staff, technology, and additional workstations. However, in the current pharmacy economy, it is exceedingly difficult for outpatient pharmacies to make a profit on prescription filling alone, due to, in part, poor reimbursement from insurance vendors. While there are likely to be some start-up costs involved, implementation of additional clinical services can become a supplemental stream of income for outpatient pharmacies. With the implementation of Medicare Star ratings, the healthcare system has refocused on quality of service, rather than quantity, serving as a motivator for providers to ensure more comprehensive and individualized care for each patient. Although pharmacies do not receive their own Star ratings, they may act as an intermediary between payers and patients to help optimize medication regimens. Insurance companies therefore offer various pay-for-performance programs to compensate pharmacies for helping improve their quality measures. Medication therapy management (MTM) platforms, such as *Mirixa* and *Outcomes*, disseminate MTM cases from insurance vendors, and in turn, compensate pharmacies for the service.^{13,14} On a more advanced level, Current Procedural Terminology (CPT) coding is available for pharmacists providing MTM services. These codes allow pharmacists to bill insurance plans and receive reimbursement for the MTM service. These codes, however, are only valid if the payer recognizes them, and the reimbursement rates vary by individual plan. Community pharmacies, therefore, can obtain supplemental reimbursement by incorporating these programs into their day to day work. Verification of dosing, switching to a less expensive therapeutic alternative, adherence counseling, and other routine pharmacy tasks are payable services found on these MTM platforms. By serving as a preceptor for a local school of pharmacy, pharmacists can employ the use of student pharmacists to enhance MTM services. Additionally, PGY-1 residencies can be established to enhance or establish services. These services can easily be partnered with Transitions of Care programs, particularly at pharmacies who specialize in patients transitioning from inpatient to outpatient facilities or those in close proximity to an inpatient facility. Discharge counseling and follow-up appointments or calls with patients are billable services through MTM platforms and CPT codes, and could therefore increase pharmacy profitability. These services may also indirectly lead to increased refill and patient retention, thus growing the dispensing portion of the pharmacy business.

The Prescriptions Plus program allowed the outpatient pharmacy to engage with patients during their delicate time of transition. This interaction provided an additional opportunity for patient issues to come to light, including confusion regarding discharge paperwork, medication questions, lack of understanding about the importance of follow-up

appointments, and other obstacles to a smooth and safe transition home. These patient-related issues, along with the cost burden of the Prescriptions Plus program, inspired the idea of a transitions of care initiative. By ensuring the patient had all necessary medications at discharge and were properly counseled, the first step of transition was complete. The TOC program grew out of a recognition that patients required follow-up care to ensure the patient and caregivers understood what responsibilities they had once they returned home. The hope was that combining these essential factors, an initial 30-day fill at the pharmacy upon discharge, as well as the follow up call within two to seven days post discharge, would demonstrate a significant decrease in 30 day readmissions. In addition to improved patient outcomes, the savings on readmission costs can further extrapolate to decreases in associated CMS fines and increases in reimbursement, and improve the facility's national readmission and STAR ratings. Savings in associated CMS fines and reimbursement was especially true in that among those targeted conditions were three of the six 6 categories from the PPACA Hospital Readmission Reduction Program, i.e., acute myocardial infarction, heart failure, and coronary artery bypass graft, in addition to other cardiovascular conditions.

Several studies exist in today's literature that examine pharmacy driven transitions of care programs and the impact on hospital readmissions. A small study conducted in Rhode Island investigated the impact of having a community pharmacist on a home health visit in congestive heart failure readmissions.¹⁵ The pharmacist performed a comprehensive medication review (CMR), along with disease state education. In addition to the at-home visit, a follow-up phone call was made at weeks 1 and 4. Of those patients who completed the intervention, 10% were readmitted within 30 days, whereas 38% of patients who did not participate were readmitted. Another study from Western Cincinnati involved collaboration between two hospitals and nine supermarket chain pharmacies.¹⁶ Patients were contacted within 72 hours and offered the opportunity to participate in the study. The intervention included a medication therapy management (MTM) visit from a community pharmacist within the first week following discharge. During the visit, the pharmacist completed a CMR, counseling and disease-state education. The visit was followed by a phone call at 2 weeks. Readmission at 30-days for the intervention group was 7%, versus 20% for the control group.

Our retrospective study compared 30-day hospital readmission among those who participated with the transitions of care program and those who did not. In this evaluation, the benefit of participation with the program resulted in over 60% decreased odds of readmission within 30 days. These findings thus substantiated the hypothesis that an outpatient pharmacy transition of care program could have a major impact on hospital readmission rates. Moreover, this decrease in 30 day readmissions can be summed to immense cost savings for the hospital system in associated costs, including potential Medicare fines or reimbursement cuts.

Although not a primary objective, this study was novel in that it has offered evidence that interventions enacted by student pharmacists are capable of positively impacting patient outcomes. Layered learning models have been used to improve access to pharmaceutical care services by leveraging pharmacist extenders, such as pharmacy residents and APPE-level students, to expand direct patient care activities.^{17,18} In an article by Hume, *et al.*, the

authors suggested that students should be exposed to issues regarding care transitions and be given opportunities to develop related skills.¹⁹ In our TOC program, the vast majority of the telephonic encounters with patients and caregivers were conducted by APPE-level student pharmacists. Although the length of phone call ranged from 1 to 40 minutes, the average counseling and medication reconciliation session required less than 5 minutes. A study by Anderson *et al.* found telephonic counselling to be effective at improving attendance at follow-up appointments and for decreasing 30-day readmissions.²⁰ This analysis corroborated Anderson's findings, as patients who had a conversation with a TOC pharmacist, which included reminders about follow up appointments, were significantly less likely to be readmitted. The use of 1–3 APPE-level student pharmacists, working full time on the transitional calls at an average of less than 5 minutes per interaction, allowed for a further-reaching intervention than would be possible with a TOC pharmacist alone, which contributed to the significant impact on readmission rates. Additionally, leveraging student pharmacists to staff the TOC program was a low-cost strategy that provided continuity and sustainability of services, all while providing an integral educational experience to the students. To our knowledge, this is the first published study to evaluate the impact of a TOC program that is driven primarily by APPE-level student pharmacists. The use of student pharmacists is a low-cost and effective strategy for staffing a TOC program.

The LACE index (length of stay, acuity of admission, comorbidity index, emergency department encounters in past 6 months) has been used by many healthcare organizations as a predictor of 30-day readmissions, in order to flag high-risk patients for additional intervention. Utilizing the LACE index has been tested and found to have moderate predictive ability for readmissions.^{21,22} When the variables included in the LACE index are analyzed independently, the number of emergency room visits in the previous 6 months has the most significant impact on readmission rates. The present study corroborates these findings as prior ED visits were also more predictive than any other patient complexity factor including number of medications at discharge.^{21–23}

A notable strength of this study was access to the hospital EMR, facilitated by the placement of the pharmacy within the healthcare system. This access overcame a frustration noted by many community pharmacists in previous research who cite lack of access as a barrier to improving patient outcomes.^{24,25} Another strength of the study is the large number of patients that were reached through the TOC program. Limitations of this study include not accounting for potential variation in patient support systems and socioeconomic status, as these may also impact the likelihood of readmission. Although insurance coverage has been used as a proxy for socioeconomic status, this measure was not directly evaluated in our study. Additionally, those referred to the TOC program had to first agree to participate in Prescriptions Plus, and therefore, may have introduced a non-response bias, as those who participated may represent a patient either more invested in their healthcare or more willing to receive help. Data was not collected regarding the reason(s) why some patients refused to participate in the Prescriptions Plus, though reasons for lack of participation may range from dissatisfaction with their care while an inpatient at the hospital (and subsequent mistrust of any future service offerings) to high satisfaction with their current community pharmacy. Lastly, readmission was evaluated through the electronic health record at our institution,

which has incomplete access to data from hospitals outside of our health system. As such, readmission frequencies may be underrepresented.

Conclusion

Post-discharge follow-up by community pharmacists have the potential to dramatically impact the rate of 30-day hospital readmissions. Integration of student pharmacists or residents can provide a low-cost strategy to facilitate program implementation and expansion. Sites without the ability to leverage students or residents may consider the integration of other pharmacist extenders, such as pharmacy technicians, into a TOC program. The current TOC program may benefit from expansion by involving pharmacy residents in workflow further validate the impact of such practice models. Future study should elucidate how best to coordinate both inpatient and outpatient pharmacy teams to further enhance patient outcomes. Work done to establish best practices in developing collaboration with other healthcare professionals would also serve to enhance patient outcomes.

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Key Points

Background

- Hospital readmissions are a growing problem, clinically and economically, and medication related events are a main cause of hospital readmissions
- Student pharmacists have been shown to be effective pharmacist extenders

Findings

- We evaluated the impact of a transition of care (TOC) program established in an outpatient pharmacy on hospital readmissions
- An Advanced Pharmacy Practice Experience (APPE)-student driven program delivered via telephone was effective at reducing the odds of 30-day all-cause and related hospital readmissions

Figure 1.

Study sample attrition

Key: TOC = transitions of care; SNF = skilled nursing facility; LTCF = long-term care facility

Table 1.

Baseline characteristics and readmission rates of TOC program participants vs non-participants

Characteristics	TOC Program participants n (%)	TOC Program non- participants n (%)	P
Total	780 (63.99)	439 (36.01)	
Age, mean (range)	66 (21–97)	62.5 (21–97)	<0.0001
Sex			
Male	449 (57.56)	276 (62.87)	0.07
Female	331 (42.44)	163 (37.13)	
Race			
White	633 (81.15)	303 (69.02)	
Black	98 (12.56)	98 (22.32)	<0.0001
Other	49 (6.28)	38 (8.66)	
RX Insurance			
Government	378 (48.46)	211 (48.06)	
Private	217 (27.82)	115 (26.20)	0.69
None	185 (23.72)	113 (25.74)	
Length of Stay, median (IQR)	3 (2–6)	3 (2–5)	0.88
Acuity of Visit			
Unplanned visit	494 (63.33)	329 (74.94)	<0.0001
Planned visit	286 (36.67)	110 (33.43)	
Charlson Comorbidity Index, mean (range)	4.9 (0–14)	4.4 (0–12)	0.0004
Emergency Department Visit			
1 in prior six months	182 (23.33)	126 (28.70)	
0 in prior six months	598 (76.67)	313 (71.30)	0.04
Discharge medications, median (IQR)	10.09 (2–25)	9.91 (0–25)	0.52
LACE Score			
High risk (10)	391 (50.13)	242 (55.13)	
Medium risk (5–9)	345 (44.23)	176 (40.09)	0.24
Low risk (4)	44 (5.64)	21 (4.78)	
All-Cause 30-day Readmission	51 (6.54)	74 (16.86)	<0.0001
Related 30-day Readmission	28 (3.59)	54 (12.30)	0.01
Call length, mean (range)	3.75 (1–40)	n/a	n/a

Table 2.

Factors associated with 30-day all-cause hospital readmission

Characteristics	Odds Ratio	95% CI	P
Age (years, continuous)	1.01	0.992, 1.02	0.43
Sex			
Male	0.85	0.58, 1.24	0.4
Female	Ref	Ref	Ref
Race			
Black	2.18	1.42, 3.34	0.0003
White	Ref	Ref	Ref
Prescription Insurance			
Government	1.22	0.78, 1.92	0.38
Private	0.69	0.39, 1.22	0.21
None	Ref	Ref	Ref
Call-length (min, continuous)	0.92	0.87, 0.97	0.003
Length of Stay (days, continuous)	1.02	0.99, 1.04	0.24
Acuity of Visit			
Unplanned visit	1.52	0.99, 2.32	0.05
Planned visit	Ref	Ref	Ref
Charlson Comorbidity Index, continuous	1.14	1.07, 1.23	0.0002
Emergency Department Visits, continuous	1.31	1.16, 1.49	<0.0001
Emergency Department Visits			
1 in prior six months	2.08	1.41, 3.06	0.0002
0 in prior six months	Ref	Ref	Ref
Discharge medications, continuous	1.04	1.00, 1.08	0.04
LACE Score, continuous	1.14	1.07, 1.21	<0.0001
LACE Score			
High risk (10)	4.56	1.09, 18.99	0.04
Medium risk (5–9)	2.83	0.67, 11.98	0.16
Low risk (4)	Ref	Ref	Ref
TOC Participation*			
Yes	0.33	0.22, 0.48	<0.0001
No	Ref	Ref	Ref

* Adjusted for Charlson Comorbidity Index, Emergency Department visits in the six months prior to the index event, acuity of visit, length of stay of the index event and number of medications at discharge.

Table 3.

Factors associated with 30-day related hospital readmission

Characteristics	Odds Ratio	95% CI	P
Age (years, continuous)	1.00	0.98, 1.03	0.82
Sex			
Male	1.61	0.79, 3.31	0.29
Female	Ref	Ref	Ref
Race			
Black	1.35	0.60, 3.01	0.46
White	Ref	Ref	Ref
RX Insurance			
Government	0.47	0.18, 1.24	0.13
Private	0.36	0.11, 1.12	0.08
None	Ref	Ref	Ref
Call-length (min, continuous)	0.96	0.89, 1.05	0.37
Length of Stay (days, continuous)	0.97	0.91, 0.33	0.33
Acuity of Visit			
Unplanned visit	1.08	0.48, 2.42	0.85
Planned visit	Ref	Ref	Ref
Charlson Comorbidity Index, continuous	0.93	0.81	1.07
Emergency Department Visits, continuous	0.89	0.70, 1.06	0.15
Emergency Department Visits			
1 in prior six months	1.03	0.50, 2.13	0.94
0 in prior six months	Ref	Ref	Ref
Discharge medications, continuous	0.92	0.85, 1.00	0.05
LACE Score, continuous	0.95	0.84, 1.07	0.40
LACE Score			
High risk (10)	1.71	0.10, 28.31	0.71
Medium risk (5–9)	1.75	0.10, 29.92	0.70
Low risk (4)	Ref	Ref	Ref
TOC Participation			
Yes	0.38	0.18, 0.82	0.008
No	Ref	Ref	Ref

* Adjusted for Charlson Comorbidity Index, Emergency Department visits in the six months prior to the index event, acuity of visit, length of stay of the index event and number of medications at discharge.