Short-term and long-term effectiveness of a post-hospital care transitions program in an older, medically complex population

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ABSTRACT

Background: Care transition programs can potentially reduce 30 day readmission; however, the effect on long-term hospital readmissions is still unclear.
Objective: We compared short-term (30 day) and long-term (180 day) utilization of participants enrolled in care transitions versus those matched referents eligible but not enrolled.
Design: This cohort study was conducted from January 1, 2011 until June 30, 2013 within a primary care academic practice.
Participants: Patients at high risk for hospital readmission based on age and comorbid health conditions had participated in care transitions group (cases) or usual care (referent).
Main measures: The primary outcomes were 30, 90, and 180 day hospital readmissions.. Secondary outcomes included: mortality; emergency room visits and days; combined rehospitalizations and emergency room visits; and total intensive care unit days. Cox proportional hazard models using propensity score matching were used to assess rehospitalization, emergency room visits and mortality. Poisson regression models were used to compare the numbers of hospital days.
Key results: Compared to referent ($n=365$), Mayo Clinic Care Transitions patients exhibited a lower 30 day rehospitalization rate compared to referent; 12.4% (95% CI 8.9–15.7) versus 20.1% (95% CI 15.8–24.1%), respectively ($P=0.002$). At 180-days, there was no difference in rehospitalization between transitions and referent; 39.9% (95% CI 34.6–44.9%) versus 44.8% (95% CI 39.4–49.8%), ($P=0.07$).
Conclusion: We observed a reduction in 30 day rehospitalization rates among those enrolled in care transitions compared to referent. However, this effect was not sustained at 180 days. More work is needed to identify how the intervention can be sustained beyond 30 days.

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1. Introduction

To attain the triple aims of health care reform of better outcomes, patient experience and lower cost, it is crucial to provide enhanced care for those who utilize a high level of healthcare.[1] One method to improve care involves a reduction in rehospitalization through improved care transitions.[2] In care transitions, providers transition care from the hospital provider to the outpatient healthcare provider. Dedicated care transitions programs can target specific interventions following hospitalization to improve this handoff process. These programs vary widely in the specific intervention, patient population, and length of intervention. Some transition programs involve a home visit by either a nurse or an advanced practice clinician (APC) such as a nurse practitioner or a physician's assistant.[3] These APCs reviewed medications, educated the patient, and coordinated upcoming appointments. In comparison, some models employed a health coach to help navigate the hospital dismissal process, which resulted in a 50% rehospitalization reduction.[4] Previous work has also demonstrated that standard discharge processes including a phone follow-up component resulted in 30% rehospitalization reductions.[5] A recent meta-analysis identified the reductions in

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rehospitalization and improvement in continuity of care after the initiation of a care transitions program.[6] A number of observational and quasi-experimental studies have also demonstrated the effectiveness of utilizing care transition programs to decrease 30 day rehospitalization rates.[7–9] An analysis of 42 studies found that the programs that included frequent home visits and multimodal interventions were most successful at decreasing rehospitalization rates by 18%.[10] Furthermore in a study of 1042 Medicare patients, those patients who received an RN home visit had a lower odds of 30 day hospital readmission when compared to those individuals not receiving the intervention (OR 0.61 95% CI 0.42–0.88).[7] The effectiveness of care transitions beyond 30 days is even less well known. To achieve the sustainability necessary for the healthcare system, long-term effectiveness of such interventions is vital.

Our implementation of the care transition program centered upon a model that adapted features of the APC model.[9] The Mayo Clinic Care Transitions (MCCT) team visited patients at their homes within 1–5 business days following hospital discharge. Our initial prospective cohort pilot comprised of 40 subjects demonstrated the feasibility of the program and allowed for normalization of the intervention.[11] However, the short-term and long-term effectiveness of this intervention was not firmly established. Such information will be essential to ensure that additional healthcare resources are achieving the expected outcomes. For this reason, we tested both the short-term and long-term effectiveness of the care transitions program using a cohort study. We hypothesized that the MCCT group would exhibit both a lower 30 and 180 day rehospitalization rate compared to a matched MCCT referent group. Secondarily, we further hypothesized that the MCCT group would reduce their combined hospital and emergency rooms (ER) visits, intensive care unit (ICU) days, hospitalization days and mortality compared to the MCCT controls.

2. Methods

2.1. Participants within the Mayo Clinic Care Transitions Program

This study involved the follow-up of two cohorts of patients, those who were enrolled in the MCCT program and those possessing similar characteristics but not enrolled. The clinical implementation of the MCCT was phased in across the practice by primary care team beginning January 1, 2011. The study was conducted at an academic medical center containing three outpatient sites of care. In 2012, there were over 138,000 patients empaneled within the primary care practice. The period of the study spanned from January 1, 2011 through June 30, 2013.

2.2. Eligibility criteria for Mayo Clinic Care Transitions

For inclusion in the MCCT program, participants were over the age of 60 and had experienced prior hospitalization coupled with high medical complexity. We determined medical complexity based on the Elder Risk Assessment (ERA) scores with scores of ≥ 16 at discharge eligible for MCCT.[12] An ERA score ≥ 16 allowed placement of a patient within the top 10% for risk of hospitalization and/or ER visit within 2 years.[12] We used the ERA score closest to the index discharge up to one month before or after hospitalization. MCCT patients were excluded if they were enrolled in another care management program which included hospice, dialysis, and transplant. All patients in the MCCT group (and referent group) possessed the right to refuse medical record review for retrospective research studies. Patients were excluded if they elected to refuse medical record review in accordance with Minnesota state law.[13] One of the investigators (S.P.) confirmed status within the MCCT program and verified enrollment with clinical

staff if needed. This study was approved by the Mayo Clinic's Institutional Review Board.

2.3. Referent subjects

Referent subjects included hospitalized patients who met the MCCT criteria of age over 60, index hospitalization and ERA score ≥ 16. Referent subjects were unable to participate in MCCT due to program capacity, receiving primary care from a team that was not being served by the program at the time, or qualifying patients who were otherwise missed. Referents were excluded if they declined MCCT participation or met exclusion criteria of hospice, dialysis, or transplant service admission, or refused research access to medical records. Propensity scores (described in Statistical Analysis) were used to match MCCT patients with referents.

2.4. Electronic medical record

The derivation of both the MCCT group and the referent group was facilitated by use of the electronic medical record (EMR). Patients within the MCCT cohort were identified using Amalga (Microsoft, Redmond, WA). We used the EMR to identify referent patients.[14]

The EMR contained information on patient demographics, index and prior hospitalization, and other utilization, comorbid disease and ERA scores. Trained statistical staff administratively obtained the ERA scores from the EMR. Amalga calculated the ERA based on age, previous hospital days, and comorbid health conditions. The comorbid health conditions were obtained by using ICD-9 billing codes within the 10 years prior to the hospitalization.

2.5. Mayo Clinic Care Transitions Program

The MCCT relied upon an RN-based enrollment process during the index hospitalization. The RN would approach the patient within the hospital setting to see if he/she would be interested in participating within the program which would include a home visit after hospital dismissal. The APC visits the patient in the home within 1–5 business days following hospital discharge, and the patient is enrolled after the home visit. All patients in the MCCT had at least one post-discharge home APC assessment. The APC provided medication reconciliation, chronic illness management, acute illness assessment, patient education in self-care, as well as contingency planning for changes in clinical status or community resource liaisons. The APC also reviewed the patient's mobility, safety, cognition, and caregiver support. The participants also received care from the RNs via telephone coordination and symptom triage. An interdisciplinary team comprised of a geriatrician, APC and RN reviewed the status of MCCT patients weekly. The geriatrician served as a consultant for the team. The APC communicated as needed with the patient's primary care provider. The MCCT program was intended to last from a minimum of 1 month to as long as 3 months. The APC discharged the patient from MCCT based on the interdisciplinary team's clinical judgments.. Communication of the patient's dismissal was provided to the primary provider. The MCCT team served one academic primary care practice at three sites, and documented medical care within the EMR. Patients were monitored by utilizing a specific registry within the Amalga Unified Intelligence System, which is a unified health enterprise platform designed to retrieve and display patient information from many sources within the EMR.[15]

2.6. Follow up of health outcomes

The primary outcomes were all-cause hospital readmission within 30-, 90-, and 180-days of hospital discharge. The secondary