Evidence suggests that patient transitions from hospital to home are suboptimal resulting in ineffective care and costly readmissions. Strengthening the transition from hospital to home is an important component of improving the patient’s experience of care and reducing cost.

The Care Transitions Intervention (CTI) has demonstrated efficacy in reducing hospital readmission rates in chronically ill older adults but little data are available on whether and to what extent there is benefit beyond 30 days, and for populations other than Medicare beneficiaries.

The objective of this community-wide Quality Improvement (QI) project was to explore the impact of CTI on a diverse population’s hospital admission rates at 30, 60, and 90 days post index discharge. The results suggest that the intervention is most effective in patients who complete the CTI full program.

Additionally, the QI methodology used is susceptible to biases regarding patient selection and other factors which may have influenced results. When adjusting our analysis for factors found to impact readmission rates, the effect continues to be present after 60 and 90 days post-discharge.

The effectiveness of CTI extends beyond the controlled environment of a Randomized Clinical Trial, demonstrating a lasting impact on admission rates at 30, 60 and 90 days for a heterogeneous patient population. CTI appears to be a reasonable addition to a multi-faceted intervention to reduce preventable readmissions in patients with chronic diseases.

Further research to identify patient characteristics that may be associated with achieving the goals of CTI would be beneficial as the associated with achieving the goals of CTI would be beneficial as the

## Study Design

A prospective cohort design was employed to link and analyze data gathered by CTI coaches and insurer-based claims. Data were collected on patient demographics-exposure to CTI and hospital utilization post-discharge at 30, 60 and 90 days.

Patients were categorized into one of three groups based on their exposure to CTI:

- **Completed CTI**
  - Completed at least 1 home visit and 3 or more encounters with the coach

- **Partial completer**
  - Completed at least 1 home visit

- **Non-completer**
  - Did not complete a home visit. This group included patients who declined or were lost to follow-up prior to the completion of a home visit

Descriptive statistics were calculated to summarize available sociodemographic and clinical characteristics. Odds ratios were calculated for 30-60- and 90-day hospital admissions using exposure to the CTI program as the primary independent variable and adjusted for other covariates (age and insurance type) found to be associated with hospitalization.

Care Transitions Intervention

Patients who enrolled in the CTI program were offered a hospital visit shortly after discharge and three weekly follow-up telephone calls. The staff who served as CTI coaches were nurses, educators or social workers and completed the CTI coach training program.

During the CTI interactions the four pillars of the program were reinforced:

- Medication self-management
- Development of a patient-centered health record
- Follow-up with care team soon after discharge
- Knowledge of red flag/symptoms

### Population Studied

699 patients were approached in the Emergency Department, Observation unit or inpatient service to participate in CTI between October 2010 and April 2011.

Patients were insured by non-FFS payer types including Medicare Advantage and commercial payers. Eligible patients were enrolled with an active diagnosis that included CHF, CAD, Pneumonia, COPD, Diabetes or UTI. Other patients who could potentially benefit from CTI were considered on a case by case basis.

### Principal Findings

#### Table 1: Demographic and clinical characteristics of patients

<table>
<thead>
<tr>
<th>Variable</th>
<th>Completed CTI (n=179)</th>
<th>Partial completer (n=103)</th>
<th>Non-completer (n=359)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Mean years (sd)</td>
<td>68.30 (13.28)</td>
<td>66.13 (14.56)</td>
</tr>
<tr>
<td>Range in years</td>
<td>22-96</td>
<td>21-99</td>
<td>21-99</td>
</tr>
<tr>
<td>Payer type</td>
<td>Commercial</td>
<td>55 (30.7%)</td>
<td>35 (34.0%)</td>
</tr>
<tr>
<td>Medicare Advantage</td>
<td>112 (62.6%)</td>
<td>62 (60.2%)</td>
<td>241 (67.3%)</td>
</tr>
<tr>
<td>Medicaid FFS</td>
<td>11 (6.1%)</td>
<td>6 (6.5%)</td>
<td>19 (5.3%)</td>
</tr>
<tr>
<td>Other</td>
<td>1 (0.6%)</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
</tr>
</tbody>
</table>

To test statistical significance, Poisson was used for categorical variables and ANOVA was used for continuous variables. *Significant at P<.05

#### Table 2: Results from Multivariate Logistic Regression analysis for 30, 60, and 90 day hospital utilization

<table>
<thead>
<tr>
<th>Exposure to CTI</th>
<th>30-Day (n=639)</th>
<th>60-Day (n=639)</th>
<th>90-Day (n=638)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-completer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partial completer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Completed CTI</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>1.00 (0.98, 1.02)</td>
<td>1.00 (0.98, 1.02)</td>
<td>1.00 (0.99, 1.03)</td>
</tr>
<tr>
<td>Age</td>
<td>0.98 (0.96-1.00)</td>
<td>1.00 (0.98-1.02)</td>
<td>1.01 (0.99-1.03)</td>
</tr>
<tr>
<td>Payer type</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commercial</td>
<td>1.0 (Reference)</td>
<td>1.0 (Reference)</td>
<td>1.0 (Reference)</td>
</tr>
<tr>
<td>Medicare Advantage</td>
<td>2.94 (1.03-8.03)</td>
<td>1.97 (1.10-3.54)</td>
<td>2.06 (1.19-3.50)</td>
</tr>
<tr>
<td>Medicaid FFS</td>
<td>2.17 (0.87-5.44)</td>
<td>2.39 (1.07-5.32)</td>
<td>2.19 (0.99-4.82)</td>
</tr>
</tbody>
</table>

*Significant at P<.05, Regression model adjusted for exposure to CTI, age and payer type.

#### Figure 1: Patient enrollment and analysis flow diagram

#### Figure 2: Unadjusted rate (%) of participants with ≥1 hospital admission post-discharge comparing patients based on exposure to CTI

#### Figure 3: Percentage of patients with ≥1 hospital admittance post-discharge

#### Table 3: Results from Multivariate Logistic Regression analysis for 30, 60, and 90 day hospital utilization

#### Discussion

The Care Transitions Intervention has demonstrated efficacy in reducing hospital readmission rates in chronically ill older adults but little data are available on whether and to what extent there is benefit beyond 30 days, and for populations other than Medicare beneficiaries.

The objective of this community-wide Quality Improvement (QI) project was to explore the impact of CTI on a diverse population’s hospital admission rates at 30, 60, and 90 days post index discharge.

The results suggest that the intervention is most effective in patients who complete the CTI full program. The QI methodology used is susceptible to biases regarding patient selection and other factors which may have influenced results.

- **Convenience sample**
  - The population enrolled may have different characteristics than the general population, limiting generalizability (e.g., less ill, longer hospitalization, available during business hours) which may limit the generalizability of our findings.

- **Availability of data**
  - Our ability to track patient deaths was limited. Including patients who may have died could contribute to an underestimate of the hospitalization rate. This may have had a greater impact on the results from non-completer group.

- **Data for key demographics including gender and race/ethnicity were unavailable preventing us from adjusting our analysis for factors found to impact readmission rates.

### Implications for policy-delivery or practice

The effectiveness of CTI extends beyond the controlled environment of a Randomized Clinical Trial, demonstrating a lasting impact on admission rates at 30, 60 and 90 days for a heterogeneous patient population. CTI appears to be a reasonable addition to a multi-faceted intervention to reduce preventable readmissions in patients with chronic diseases.

Further research to identify patient characteristics that may be associated with achieving the goals of CTI would be beneficial as the program is extended to more diverse populations.

### Acknowledgements

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