



A predictive analytics platform powered by non-medical staff reduces cost of care among high-utilizing Medicare fee-for-service beneficiaries

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Background

There is increasing pressure on healthcare organizations to prevent avoidable admissions and reduce the cost of care. Coupled with socioeconomic and behavioral health factors, breakdowns in care coordination lead to increased risk for use of emergency department and facility care. Care at Hand is an analytics platform that has been shown to help providers:

- Reduce readmissions by extending the reach of nurses through use of less costly non-medical staff¹, and
- Predict hospitalization risk up to 120 days using non-medical staff.²

This study set out to explore the impact the Care at Hand technology may have on overall acute care healthcare utilization. We used Medicare claims data to compare high-cost adverse event rates and spending between beneficiaries who received care transitions services support by Care at Hand with a matched group of beneficiaries who did not receive Care at Hand's program.

The full text of this analysis is available upon request. This synopsis identifies key points of interest, subject to the limitations described below.

Methods

Participants and Settings

Participants in this study consisted of Medicare FFS beneficiaries who received care transitions services from Elder Services of Merrimack Valley (ESMV), a Massachusetts-based Area Agency on Aging (AAA). Intervention group members were individuals continuously enrolled in Medicare Parts A and B for at least 12 months (without any Medicare Advantage enrollment), age 65 or older, and living in the Merrimack Valley or contiguous counties. A comparison group consisted of Medicare FFS beneficiaries living in the same geographic area as those identified as the intervention group, with similar combination of risk factors such as age, sex, and medical conditions and comorbidities.

Claim-level data from The Centers for Medicare & Medicaid Services (CMS) were used to calculate performance metrics and develop risk adjustment models. We used a matched-cohort design, where each intervention group member was matched to an individual with a similar risk

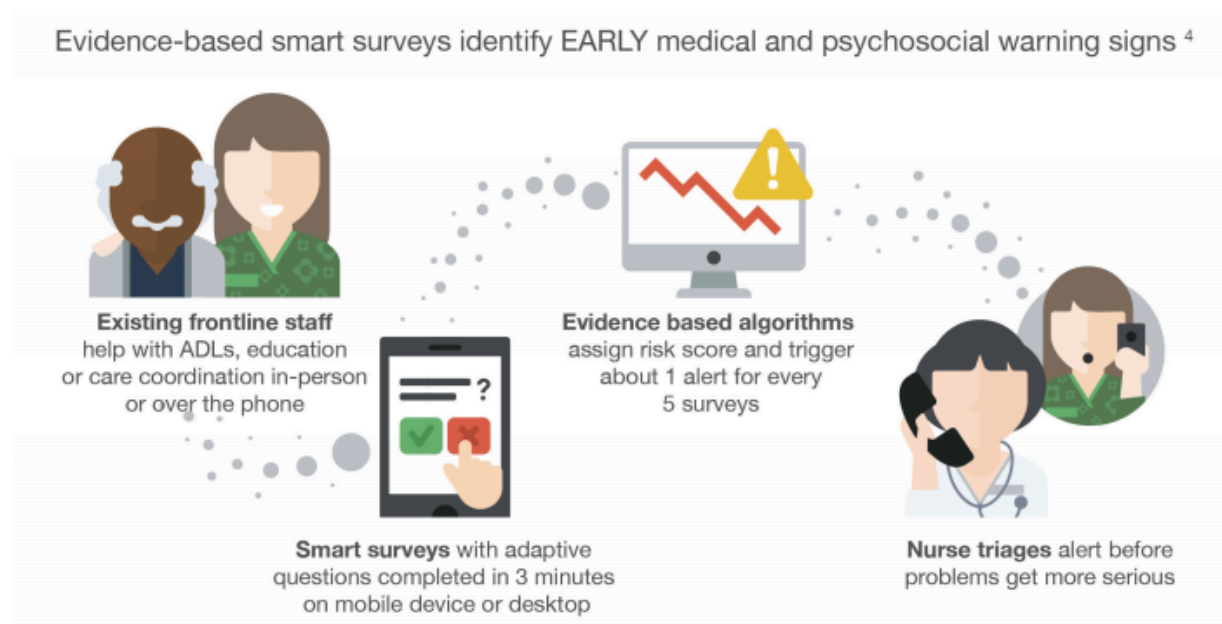


profile, to construct the comparison group. The matching algorithm yielded a sample of 336 Care at Hand and an equivalent number of Medicare FFS beneficiaries for the comparison group.

Care Delivery & Technology Intervention

Between physician visits, non-medical staff members often communicate with patients as part of usual care. Using Care at Hand's evidence-based three-minute surveys delivered on a mobile device or computer, these frontline personnel are prompted to collect valuable observations during routine in-person or telephonic contacts with patients. These observations are transformed into clinically relevant alerts by Care at Hand analytical tools and sent to a supervising nurse for early detection and intervention.

Unlike risk prediction approaches that rely on claims or EHR data, Care at Hand is designed to fill the blind spot between doctor visits, enabling care teams to identify medical and psychosocial risk factors while they are still actionable. This early identification and intervention promotes timely, proactive care coordination and avoid costly acute care. Combined with a strong care transition program, Care at Hand moves risk prediction from episodic use of claims data to continuous capture of insights of frontline non-medical personnel.



Data Sources

The analysis used hospital admissions information from July 2013 through December 2013 to develop a profile of the patient population in an intervention group receiving enhanced care coordination services with Care at Hand's technology. Care at Hand provided Avalere data for 2,299 patients who received care transition services from ESMV during July-December, 2013.



Data were drawn from 2013 since this was the most recent years for which FFS Medicare data were available.

Avalere obtained diagnoses for risk adjustment from Medicare 100 percent Limited Data Set (LDS) Standard Analytical Files (SAFs) from 2012 hospital inpatient and outpatient, skilled nursing facility, and home health SAFs. Expenditure and Medicare program utilization were obtained from 2013 SAFs.

Statistical Approach

The analysis used a matched cohort analysis for this study. The analysis included a Nearest Neighbor Matching (NNM) model, a two-step quasi-experimental method designed to identify and compare two cohorts, simulating a randomized controlled trial where one cohort is identified as the “treatment group” and the other is considered a “control group” that does not receive the intervention.

The first step was an analysis of patients provided in Care at Hand’s census reports: age, sex, Medicare FFS enrollment criteria, and zip code. Based on these parameters, we identified a cohort of individuals who were most likely touched by services using the Care at Hand technology.

The second step was a logistic regression that included all intervention patients and all potential comparison group members. This model estimates the similarity of each comparison group member to each member of the intervention group using an indicator for Care at Hand as the dependent variable and the following patient-level characteristics as covariables:

- Resident of Merrimack Valley and contiguous counties
- Age range (under 65, 65-74, 75-84, 85+)
- Sex
- Dual eligibility for Medicare and Medicaid
- Clinical conditions using the Agency for Healthcare Quality (AHRQ) Healthcare Cost and Utilization Project (HCUP) Clinical Classifications Software (CCS) Categories
- CMS Hierarchical Condition Categories (HCC)
- Acute patient hospitalization in 2012

Clinical condition groups were created by mapping enrollee’s prior year inpatient and outpatient claims (excluding DME and hospice) into AHRQ HCUP CCS 3-Level condition categories and then combining and aggregating to 31 condition groupings.

In this second step, each intervention patient is matched with a comparison group member who most resembles the intervention patient on the above patient-level characteristics. This was accomplished using the NNM score generated from the logistic regression and 1:1 nearest-neighbor matching with a 1 percent caliper (maximum allowable propensity score difference). The output of this analysis yielded 336 Care at Hand patients in the intervention group and 336 members in the comparison group.



Outcome Measures

We selected three dependent variables to measure impact of the intervention:

- 1) Utilization rates: hospitalizations, readmissions, and emergency department (ED) visits
- 2) Days until the next adverse event: days between hospital discharge and readmission or ED visit
- 3) Medicare spending

For each of the three performance measures, we developed a risk-adjustment model estimating the outcome if the comparison group had the same risk profile as the intervention group. The risk adjustment models used a prospective approach where patient-level characteristics and the prior year (2012) utilization predict outcomes in the subsequent year (2013).

Results

Our analysis pointed to a generally positive trend in patient outcomes, including less adverse events and lower Medicare spending for Medicare FFS beneficiaries who received care transitions services using Care at Hand's technology platform.

Key findings observed in risk-adjusted results comparing Care at Hand to comparison group:

All beneficiaries (average 1.25 admissions in prior year)

- (1) 14.2% decrease in inpatient admissions ($p=0.09$)
- (2) reduction of \$9,056 in Medicare A inpatient expenditures per beneficiary per year ($p<0.05$)
- (3) 3.1 more days between hospital discharge and readmission when there was a readmission within 30 days of discharge ($p<0.001$)
- (4) 2.0 more days until ED visit when there was an ED visit within 30 days ($p<0.001$)

Beneficiaries with 3 or more admissions in the prior year

- (1) 29.2% decrease in inpatient admissions ($p=0.08$)
- (2) reduction of \$28,656 in Medicare A inpatient expenditures per beneficiary per year ($p<0.05$)
- (3) 3.3 more days between hospital discharge and readmission when there was a readmission within 30 days of discharge ($p<0.001$)
- (4) 2.1 more days until ED visit when there was an ED visit within 30 days ($p<0.001$)

Discussion

The matched-cohort analysis identified a decrease in adverse event rates and lower cost among Medicare beneficiaries who received care transitions services through Care at Hand relative to a comparison group.



The analysis also reveals a phenomenon recently described by Lynn and Jencks (2015) whereby effective care transition programs may not demonstrate improved readmission rates, and may even increase them. It is postulated that an overall reduction in admissions can lower the denominator of overall admissions leading to an increase in readmission rate.

A reduction in admissions in the absence of a comparable improvement in readmissions and unchanged acute inpatient costs and ED utilization suggest that the savings may have emerged from less expensive post-acute inpatient services. Such services include skilled nursing facility (SNF) use and skilled home health.

The success of this model may be attributable to the efficient use of existing low-cost frontline staff while only engaging more expensive clinical staff as directed by the predictive technology. Other contributing success factors include evidence-based algorithms and granular data capture of both medical and psychosocial risk factors.

Additional analyses are planned to overcome analytical limitations and enhance the strength of conclusions.

Limitations

- The results of the analyses are generally positive; however, few showed statistically significance. See Table 1 for key findings showing statistical significance. (Appendix with additional, detailed findings is available on request.)
- Analyses used Medicare 100 percent Standard Analytical Files; no state Medicaid data were used.
- We used encounter-level data provided by Care at Hand, which was hand-coded by hospital staff and other clinical and non-clinical staff; there was a high degree of error in hospitalization dates, making it very challenging to identify the intervention group in claims data files.

Estimated costs were based on the total average cost of hospitalizations, readmissions, and ED visits in the matched sample. We did not model which specific hospitalizations, readmissions or ED visits, and associated costs, could have been more easily avoided.

Conclusion

Within stated limitations, this analysis points to an annual reduction of \$9,056 in Medicare inpatient cost per beneficiary per year among patients enrolled in a care transition program utilizing Care at Hand methodology.

Avalere Leadership

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Care at Hand Program Leadership

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For Further Information

Visit Care at Hand Web site at careathand.com, Care at Hand Blog at blog.careathand.com or contact Ms. O'Connor at info@careathand.com.

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