Digital caregiver empowerment program reduces utilization and costs for Medicare Advantage members with Alzheimer's Disease and Other Dementias (ADOD)

Summary of pilot study results conducted in Harvard Pilgrim Health Care's Medicare Advantage population; presented by Point32Health, a leading New England health plan during a national webinar[1] hosted by CCMI, the federal government's Medicare innovation center, on October 7, 2021.

Overview.

Alzheimer Disease and Other Dementias (ADOD) is the condition feared the most by adults aged 60 years and older. In a typical Medicare Advantage (MA) population, ADOD drives 27% of hospital admissions and 21% of total medical costs[2]. Because members with ADOD lose the ability to self-manage their health, ADOD requires high levels of caregiver support. Caregiver support is recognized by clinicians at leading health system as one of most impactful initiatives to improve dementia care[3]. Members with ADOD frequently rely on family caregivers (spouses, adult children) to implement their care plans, yet most family caregivers are stressed, and lack the knowledge, skills and confidence required to provide effective care for a loved one.

In this study we deployed the Ceresti Caregiver Empowerment Program (CCEP) to family caregivers of Medicare Advantage members with ADOD. We evaluated the impact of this digital health program on member healthcare cost and utilization, and on caregiver healthcare cost, mental health and satisfaction. CCEP process metrics were also tracked to evaluate caregiver engagement and compliance to completing remote risk assessments.

Digital Caregiver Empowerment Program (CCEP)

Caregivers enrolled in the CCEP received a Ceresti-supplied, cell-enabled, single-purpose tablet with an elder-friendly user menu. Caregivers engaged in a comprehensive 6-month program of personalized education, evidence-based support, proactive coaching and participated in remote monitoring of their loved one's (member's) health via tablet-based risk assessments.

Personalized education was delivered in the form of structured daily plans comprising educational content (e.g., videos, tutorials, interactive sessions, assessments) that were curated from Ceresti's extensive content library. Daily plans were automatically updated using Ceresti's algorithm-driven workflow engine and were supplemented by content added on an ad-hoc basis by caregiver coaches based on caregiver's immediate needs.

Enrollment.

The CCEP was offered, via direct mail, to family caregivers of all health plan Medicare Advantage members (approximately 900) who had at least one ICD-10 code for ADOD. Telephonic outreach and referrals from care management resulted in approximately 800 conversations with a Ceresti enrollment specialist and resulted in 164 caregivers enrolling in the CCEP.

Methods

Claims Analysis

Enrolled members were included in the claims analysis if their caregiver was enrolled in the CCEP for at least 45 days. Member outcomes were compared to outcomes from a propensity matched control group, post-index, from the Program start date to the end of claims data using a difference-in-differences approach. The first 30-

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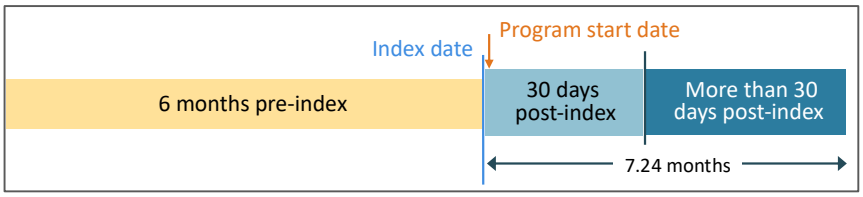
days post-index were deemed a "transition" period. The impact of the CCEP was determined by comparing the pre-index averages to outcomes from the 30-day post-index period (Figure 1). Winsorization[4] at 98% was applied to cost data, prior to matching, to reduce the effect of possible spurious outliers on the pre-index matching.

Figure 1. Claims Analysis Methodology



Three (3) matched control members were selected for every enrollee member based on propensity matching on demographic, medical, utilization, and cost variables in a 6-month period prior to the date of enrollment in the CCEP, i.e., the index date. Table 1 summarizes the matching results

Table 1. Summary of Propensity Matching for Members

	Ceresti Enrollees Mean	Matched Controls (with ADOD) Mean	Enrollees - Controls Difference	P-Value
Number of Members with >=45 days Post-index Data	131	393		
Days Enrolled in Program	217.31	0.00	217.31	0.0000
Age (as of 8/4/2021)	81.53	81.44	0.09	0.9209
Percent Female	64.9%	63.4%	1.5%	0.7529
Percent with likely Spousal Caregiver in data (as of 8/4/2021)	30.5%	28.0%	2.5%	0.5769
Charlson Comorbidity Index (180 days pre-index)	2.45	2.38	0.07	0.7737
Number of ADOD Dxs in 180 days pre-index	4.63	4.83	-0.21	0.8459
Percent Eligible for House-Calls Program	13.0%	11.5%	1.5%	0.6394
Percent with Skilled Nursing Facility Claim*	4.6%	4.1%	0.5%	0.8014
Georgraphic Region 1	8.4%	7.9%	0.5%	0.8526
Georgraphic Region 2	48.9%	51.1%	-2.3%	0.6498
Number of Pre-index ED Visits pmpm	0.084	0.070	0.014	0.3383
Number of Pre-index Inpatient Admissions pmpm	0.053	0.045	0.009	0.5287
Pre-index Drug Costs pmpm	$308	$286	$22	0.6059
Pre-index ED Costs pmpm	$19	$15	$4	0.2512
Pre-index Home Health Costs pmpm	$194	$163	$30	0.4168
Pre-index Inpatient Costs pmpm	$513	$456	$57	0.7053
Pre-index Nursing/Assisted Living Facility Costs pmpm	$69	$80	-$12	0.7742
Pre-index Office Costs pmpm	$152	$138	$13	0.4486
Pre-index Outpatient Costs pmpm	$253	$196	$57	0.2332
Pre-index Other Costs pmpm	$45	$37	$8	0.3708
Post-index Months of Eligibility	7.24	7.24	0.00	1.0000

Predictive Analytics.

The CCEP was personalized for each caregiver/member dyad using predictive models applied to claims data. Member's risk of hospitalization was determined for the most common preventable hospitalization conditions for members with dementia (e.g., sepsis, UTI, pneumonia, falls, CHF, and stroke) and caregiver education and support was prioritized based on Member risk.

Summary of Results.

Member Outcomes

Table 2 summarizes statistically significant (p-values < 0.05) reductions in medical cost and utilization for members enrolled > 45 days, and enrolled high utilizers enrolled > 45 days. High utilizers are members with at least one hospitalization or two ED visits in the prior 24 months.

The increase in drug costs suggests an increase in medication adherence that is borderline statistically significant.

Table 2. Summary of Member Outcomes

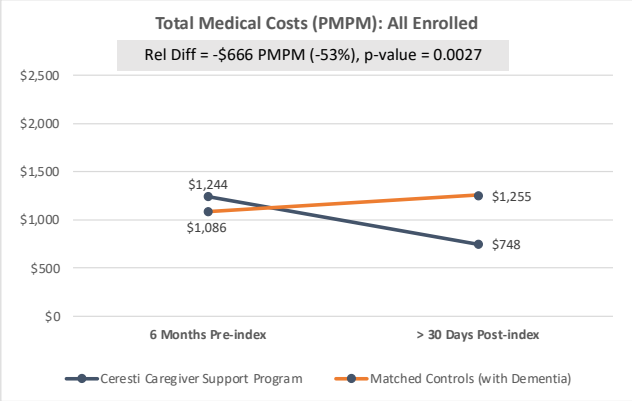
Outcomes for Enrollees vs Control, more than 30 days post-Index, to end of claims data	ALL ENROLLED (N= 131, Eligibility = 7.24 mos)			ENROLLED HIGH UTILIZERS (N= 62, Eligibility = 7.12 mos)		
	Relative Diff.	**P-value**	**% Relative Diff.**	**Relative Diff.**	**P-value**	**% Relative Diff.**
Medical Costs PMPM	**-$666**	0.003	-53%	**-$1,433**	0.0009	-64%
Inpatient Costs PMPM	**-$491**	0.003	-96%	**-$985**	0.002	-91%
Inpatient Admissions per 1,000 Members per year	**-513**	0.02	-80%	**-994**	0.02	-73%
ED Visits per 1,000 Members per year	**-424**	0.03	-42%	**-1,112**	0.003	-56%
30 Day Readmissions Rate	**-30%**	0.02	-73%	**-30%**	0.02	-73%
Drug Costs PMPM	**$53**	0.05	17%			

The following plots highlight members outcomes versus the matched control group.

- Figure 2 is a plot showing total medical cost PMPM for enrolled members versus the matched control, for all enrollees and enrolled high utilizers.
- Figure 3 is a plot showing total medical cost savings PMPM by post-index month for enrolled members versus the matched control, for all enrollees and enrolled high utilizers.
- Figure 4 is a plot showing total inpatient cost PMPM for enrolled members versus the matched control, for all enrollees and enrolled high utilizers.
- Figure 5 is a plot showing annualized inpatient admissions per 1,000 members for enrolled members versus the matched control, for all enrollees and enrolled high utilizers.
- Figure 6 is a plot showing annualized ED visits per 1,000 members for enrolled members versus the matched control, for all enrollees and enrolled high utilizers.
- Figure 7 is a plot showing 30-day readmissions for enrolled members versus the matched control, for all enrollees and enrolled high utilizers.
- Figure 8 is a plot showing drug costs PMPM for enrolled members versus the matched control, for all enrollees

We also observed a decrease in the number of enrolled members who transitioned from being low utilizers, prior to beginning the CCEP, to being high utilizers after enrollment in the CCEP (-39%, p=0.055).

Figure 2. Medical Costs PMPM



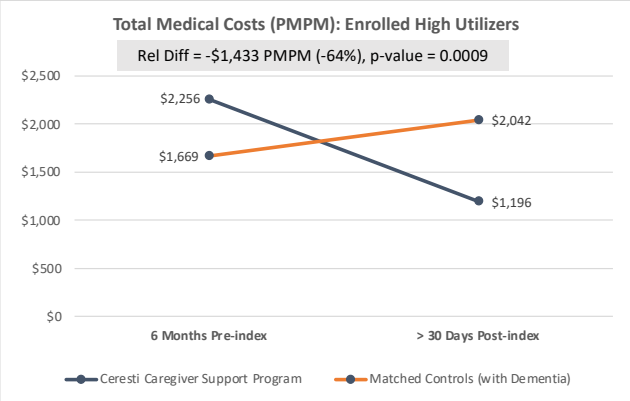
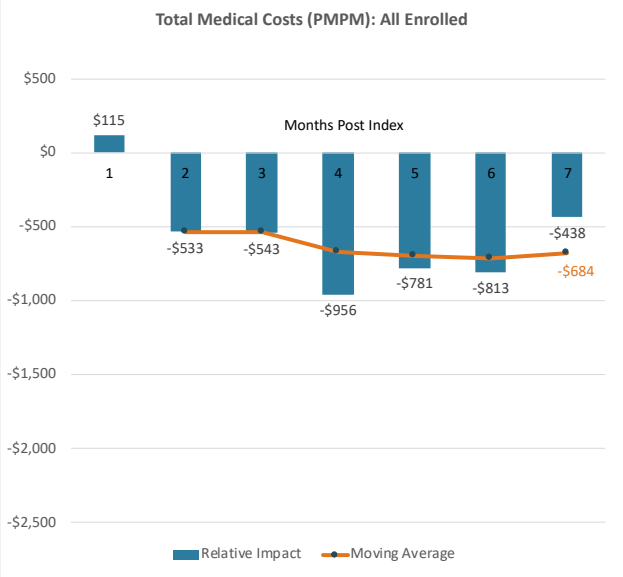


Figure 3. Medical Cost Savings PMPM by Post Index Month



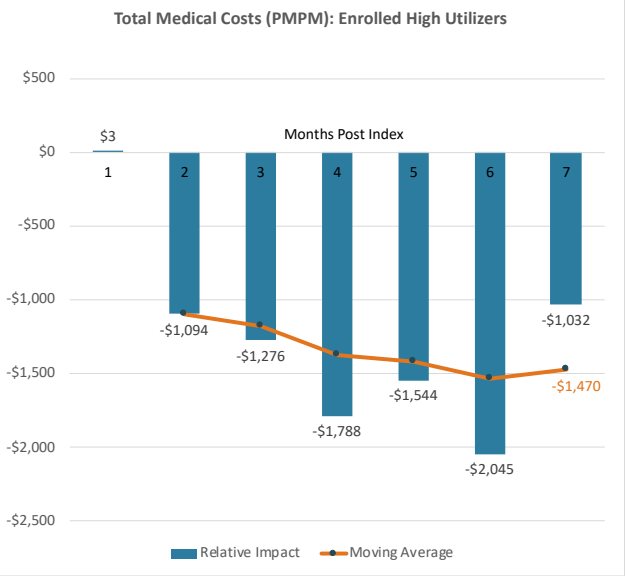
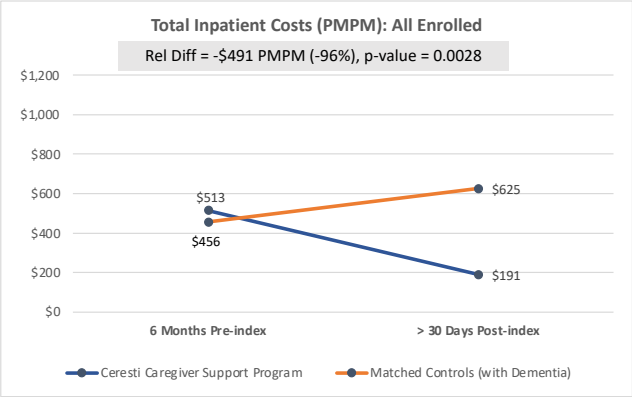


Figure 4. Inpatient Cost PMPM



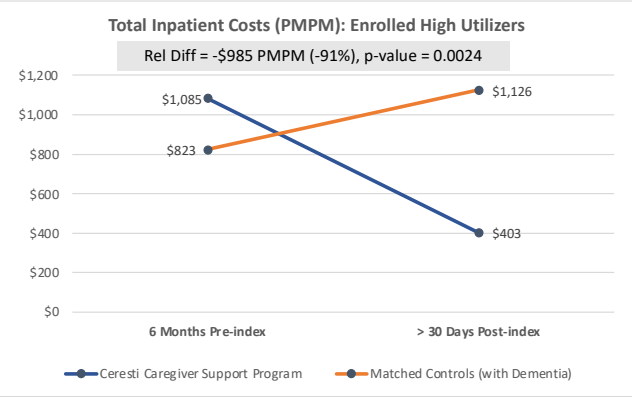


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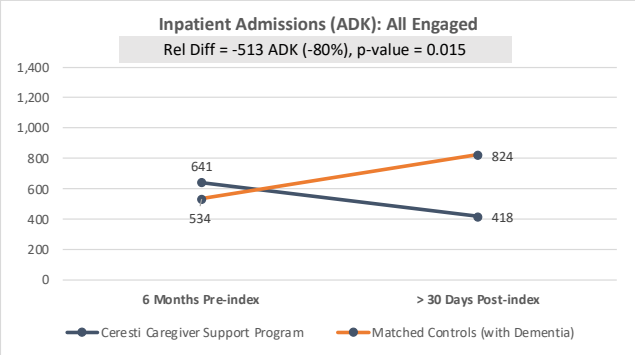
Figure 5. Inpatient Admissions per 1,000 Members per year



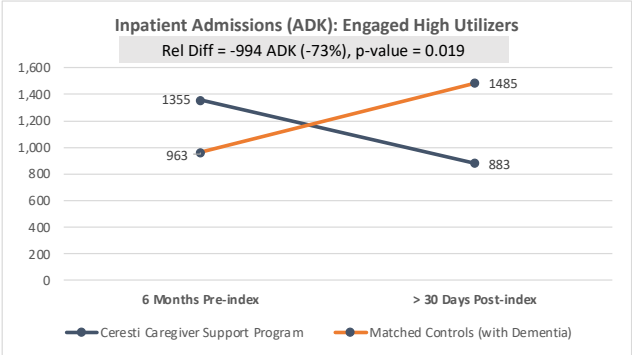
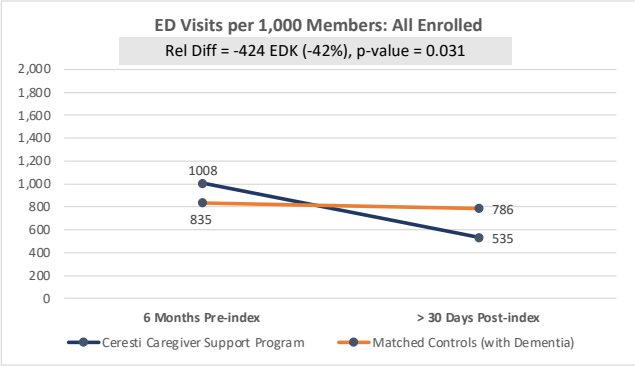


Figure 6. ED Visits per 1,000 Members per year



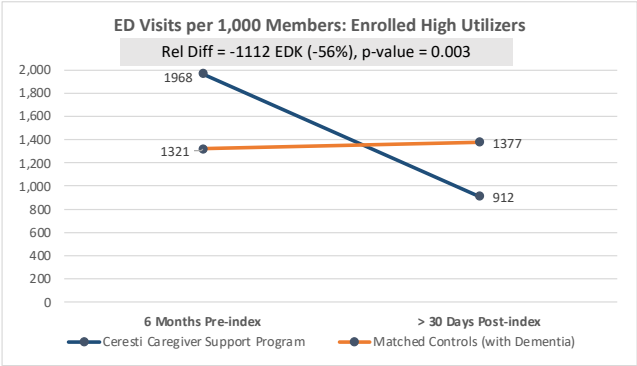
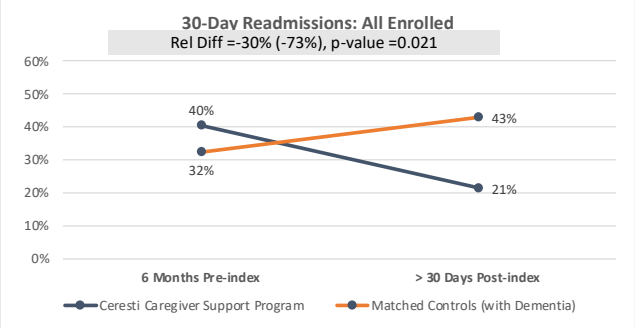


Figure 7. 30-Day Readmissions



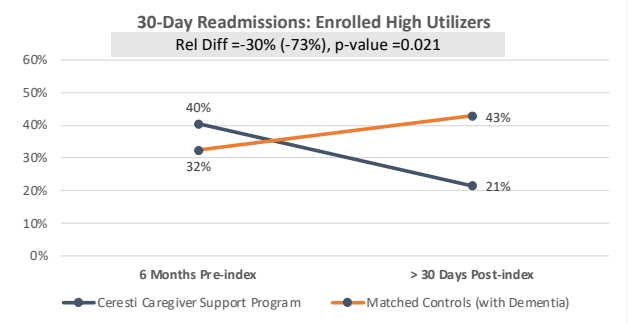
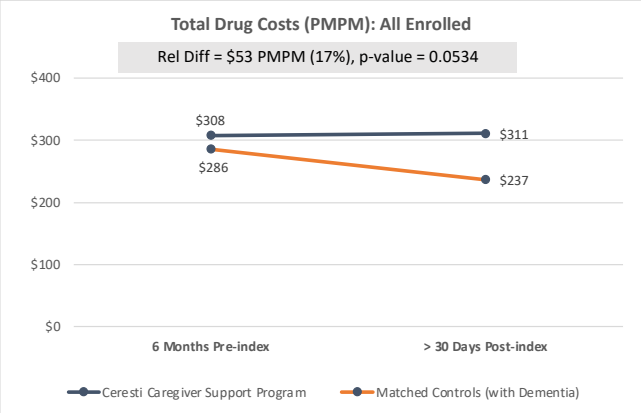


Figure 8. Drug Costs PMPM



Caregiver Outcomes

Table 3 summarizes statistically significant reductions in medical costs PMPM for spousal caregivers, as well as caregiver satisfaction and changes in the number of mental unhealthy days (MUHD) reported by caregivers.

Table 3. Summary of Caregiver Outcomes

Outcomes for Enrollees vs Control, more than 30 days post-Index, to end of claims data	ALL ENROLLED SPOUSAL CAREGIVERS (N= 35, Eligibility = 7.36 mos)		
	Relative Diff.	**P-value**	**% Relative Diff.**
Medical Costs PMPM	**-$251**	0.018	-75%

ALL ENROLLED CAREGIVERS (N=164)	**Value**	**Description**
Satisfaction (Net Promoter Score)	**75**	Caregiver satisfaction was measured using the net promoter score (NPS) assessment. Based on 275 NPS assessments completed by 90 unique caregivers throughout during the first 180 days of their CCEP, the average net promoter score (NPS) was 75.
Mental Unhealthy Days (MUHD)	**-3.1 Days**	The number of mental unhealty days (MUHD) was measured using the CDC"s Healthy Days Assessment. Based on 320 assessments completed by 107 unique caregivers during the first 180 days of their CCEP, the reduction in MUHD as determined by a linear trendline through the raw data was -3.1 Days.

Table 4 highlights the matching of spousal caregivers versus a matched control group.

Table 4. Summary of Propensity Matching for Spousal Caregiver Members

	Ceresti Enrollees Mean	**Matched Controls Mean**	**Enrollees - Controls Difference**	**P-Value**
Number of Members with >=45 days Post-index Data	35	105		
Days Enrolled in Program	220.94	0.00	220.94	0.0000
Age (as of 8/4/2021)	77.44	77.79	-0.36	0.8000
Percent Female	40.0%	42.9%	-2.9%	0.7669
Charlson Comorbidity Index (180 days pre-index)	1.17	1.15	0.02	0.9470
Percent Eligible for House-Calls Program	11.4%	8.6%	2.9%	0.6140
Georgraphic Region 1	11.4%	10.5%	1.0%	0.8746
Georgraphic Region 2	31.4%	29.5%	1.9%	0.8314
Number of Pre-index ED Visits pmpm	0.010	0.008	0.002	0.8330
Number of Pre-index Inpatient Admissions pmpm	0.000	0.000	0.000	1.0000
Pre-index Drug Costs pmpm	$151	$157	-$7	0.8882
Pre-index ED Costs pmpm	$1	$1	$0	0.9531
Pre-index Home Health Costs pmpm	$6	$3	$2	0.6111
Pre-index Inpatient Costs pmpm	$0	$0	$0	1.0000
Pre-index Nursing/Assisted Living Facility Costs pmpm	$0	$0	$0	1.0000
Pre-index Office Costs pmpm	$91	$80	$11	0.6425
Pre-index Outpatient Costs pmpm	$229	$166	$63	0.4346
Pre-index Other Costs pmpm	$10	$9	$1	0.8500
Post-index Months of Eligibility	7.36	7.36	0.00	1.0000

Figure 9 is a plot showing total medical cost PMPM for spousal caregivers versus a matched control group.

Figure 9. Medical Cost PMPM for Spousal Caregiver Members

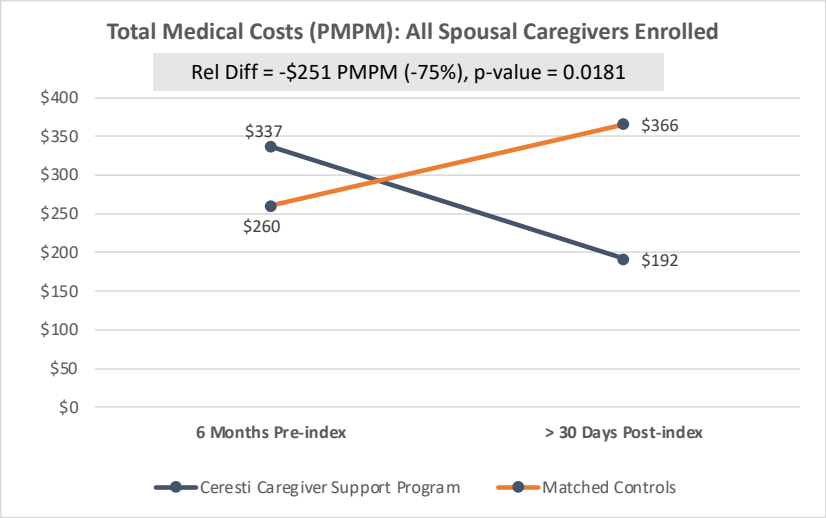
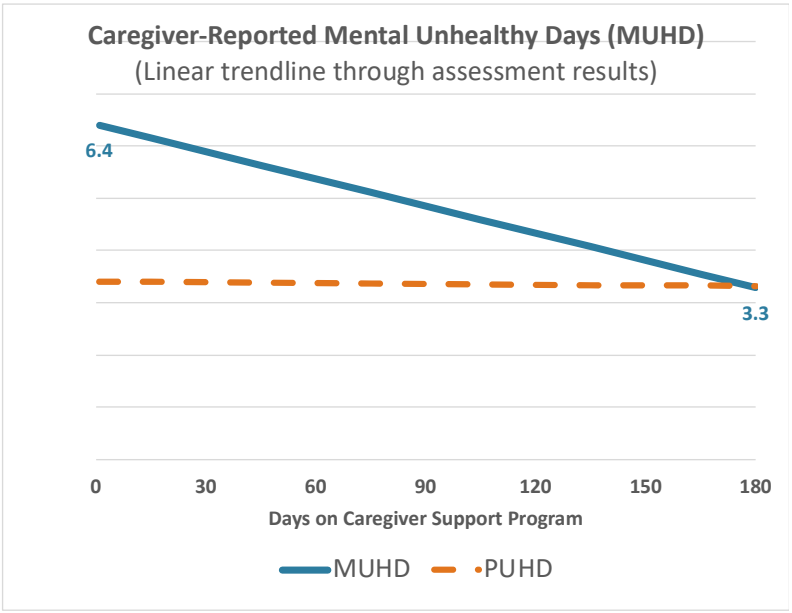


Figure 10 is a plot showing the number of mental unhealthy days (MUHD) reported by caregivers via the CDC-developed Healthy Days assessment[5]. Using data from 320 assessments completed by caregivers throughout the course of their CCEP, MUHD declined by 3.1 days, suggesting that caregiver mental health increased as a result of engaging in the CCEP. For reference, the number of physical unhealthy days (PUHD) reported by caregivers is also provided and remained largely unchanged during the course of the CCEP.

Figure 10. Reduction in Caregiver Mental Unhealthy Days (MUHD)



Process Metrics

Table 5 summarizes the CCEP process metrics, which provide insights into caregiver engagement and remote monitoring.

Table 5. Summary of Process Metrics

Measure	Result	Definition
Monthly engagement percentage	93%	Percent of caregivers enrolled in a month that "engage" in their CCEP during the month. A caregiver is considered to be an engaged caregiver if at least one of the following be true: (i) call with a coach (ii) message initiated by caregiver (iii) more than 10 minutes of education (iv) more than 5 remote assessments completed
Total engagement time	39.5 min/wk	Average of total engagement times per week in education, coaching, messaging, assessments and digital therapies, per engaged caregiver.
Total remote risk assessments completed	6,429	Total number of remote assessments completed by all caregivers that enrolled in the CCEP during this study
Remote risk assessments completed	2.2/wk	Average number of remote risk assessments completed per week per engaged caregivers

Figure 11 details the average engagement times per engaged caregiver by month, and the distribution of engagement.

Figure 11. Caregiver Engagement Times

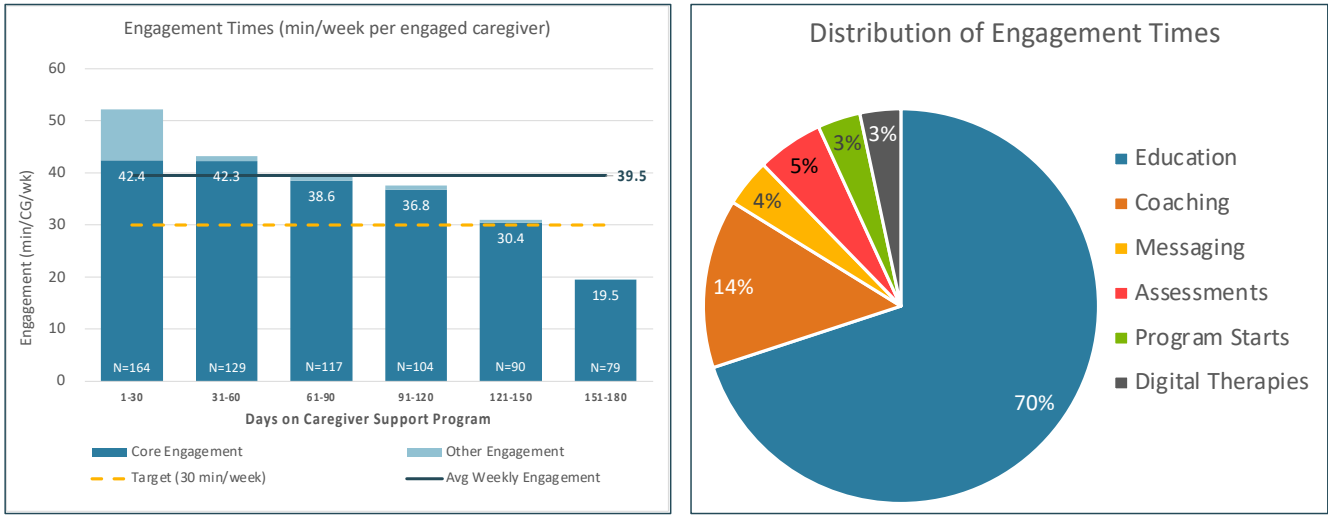


Figure 12 provides a summary of the 6,429 remote risk assessments that a provided by caregivers about the member's health.

Figure 12. Summary of Remote Risk Assessments Completed

Ceresti Risk Assessment **Total Completed = 6,429**

Events		Count	Priority
1	Important Doctor Visit	57	M
2	Hospital Admission	10	H
3	Emergency Room Visit	10	H
4	Urgent Care Visit	2	M
	Reason Given for Event	*46*	

How was your day?	Poor	Fair	Count
Caregiver Rating	28	183	211
Member Rating	70	240	310

Free Form Response Provided *1737*

Medical		Count	Priority
1	Pain Issues	125	M
2	Change in Appetite	42	L
3	Recent Fall	43	M
4	Missed Medication	40	L
5	New Medication Prescribed	36	L
6	Almost Fell	21	L
7	Medication Concerns	16	M
8	New Illness	15	M
9	Rehab Facility/Stay	6	L
10	Fever	1	M
	Total Issues Reported	**1335**	

Behavioral		Count	Priority
1	Noticeable Change in Behavior	96	M
2	Serious Change in Memory	83	H
3	Worsening Anxiety or Depression	71	M
4	Worsening Agitation or Aggression	44	M
5	Safety Concerns	48	M
6	Wandered	2	L

Assessments with L, M or H issue	742
Assessments with High Priority issue	462
Assessments with Medium Priority issue	350
Assessments with Low Priority issue	131

Conclusions

Empowering family caregivers in a digital health program comprising personalized education, evidence-based support, remote risk assessments and proactive coaching is effective in

(i) reducing medical costs and utilization for members with ADOD

(ii) increasing medication adherence for members

(iii) reducing medical costs for spousal caregivers

(iv) improving caregiver mental health

(v) achieving high caregiver satisfaction.

In addition, empowering caregivers changes the rate at which low-utilizer members become high utilizers, thus reducing the risk trajectory of a population of members with dementia.

References

[1] CMMI Webinar: Unleashing the Capabilities of MAOs to Deliver Health Innovation for Older Adults in Underserved Settings (Oct 7, 2021), recording of Point32Health presentation

[2] Smith M et al., Prevalence and Treatment Costs for Alzheimer's Disease and Other Dementia, Stroke-Like Conditions and Parkinson's Disease, Milliman white paper (July 2021)

[3] NEJM Catalyst Insights Report, Innovations in Care Delivery: The Growing Challenge of Dementia Care, Sept. 2021

[4] Weichle T et al., Impact of alternative approaches to assess outlying and influential observations on health care costs, Springerplus. 2013; 2: 614.

[5] Measuring Health Days, Population Health Assessment of Health-Related Quality of Life, U.S. CDC (Nov 2000)