Project Report

Appendices: Evaluation of Phase II of the Medicare Advantage Value-Based Insurance Design Model Test

First Three Years of Implementation (2020–2022)

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About These Appendices

These appendices supplement the Evaluation of Phase II of the Medicare Advantage (MA) Value-Based Insurance Design (VBID) Model Test, initiated by the Center for Medicare & Medicaid Innovation (Innovation Center), for the years 2020 through 2022. The evaluation was funded by the Innovation Center under Research, Measurement, Assessment, Design, and Analysis Contract Number 75FCMC19D0093, Order Number 75FCMC20F0001, for which Julia Driessen is the contracting officer's representative. It was carried out within the Payment, Cost, and Coverage Program in RAND Health Care.

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Abbreviations

ACE	angiotensin-converting enzyme
ACP	advance care planning
ACS	American Community Survey
AD	advance directive
ADLs	activities of daily living
AHRF	Area Health Resources Files
AI/AN	American Indian/Alaska Native
API	Asian or Pacific Islander
ARB	angiotensin receptor blockers
ASD	average standardized difference
ASMD	absolute standardized mean difference
AWV	annual wellness visit
BPT	Bid Pricing Tool
CAD	coronary artery disease
CAHPS	Consumer Assessment of Healthcare Providers and Systems
CCN	CMS Certification Number
CHF	congestive heart failure
CI	confidence interval
CMS	Centers for Medicare & Medicaid Services
COPD	chronic obstructive pulmonary disease
COVID-19	coronavirus disease 2019
C-SNP	chronic condition special needs plan
DD	difference-in-differences
DIR	direct and indirect remuneration
D-SNP	dual eligible special needs plan
EB	entropy balancing
ED	emergency department
ENC	encounter
ESRD	end-stage renal disease
ESS	effective sample size
FFS	fee-for-service
GDCA	gross drug cost above out-of-pocket threshold
HCC	Hierarchical Condition Category
HEDIS	Healthcare Effectiveness Data and Information Set

HIV/AIDS	human immunodeficiency virus/acquired immunodeficiency syndrome
HOS	Health Outcomes Survey
HPMS	Health Plan Management System
HPSA	Health Professional Shortage Area
HRA	health risk assessment
IADLs	instrumental activities of daily living
ID	identification
IDR	integrated data repository
I-SNP	institutional special needs plan
ITT	intent-to-treat
LICS	low-income cost-sharing subsidy
LIPS	low-income premium subsidy
LIS	Low-Income Subsidy
LOS	length of stay
MA	Medicare Advantage
MAPD	Medicare Advantage-Part D
MCS	medical component summary
MSB	mandatory supplemental benefits
MNT	medical nutrition therapy
MTM	Medication Therapy Management
OACT	Office of the Actuary
OEPs	open enrollment periods
OON	out-of-network
OOP	out of pocket
OTC	over-the-counter
PCS	physical component summary
PBP	plan benefit package
PCP	primary care provider
PCS	Physical Component Summary
PDE	Part D Event data
PDP	Part D plan
PDSS	Part D Senior Savings
PHRSB	Primarily Health-Related Supplemental Benefit
PMPM	per member per month
PO	parent organization
RI	rewards and incentives
RUCC	Rural-Urban Continuum Codes
SE	standard error

SEER	Surveillance, Epidemiology, and End Results
SES	socioeconomic status
SMD	standardized mean difference
SNP	special needs plan
SSBCI	Special Supplemental Benefits for the Chronically Ill
TCC	transitional concurrent care
UF	uniformity flexibility
VBID	Value-Based Insurance Design
WHP	wellness and health care planning

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Appendix A. Parent Organization and Hospice Interviews

This appendix describes our approach to collecting and analyzing the primary data from parent organizations (POs) and hospices. All data collection procedures have been reviewed and approved by the RAND Human Subjects Protection Committee.

In 2022, we conducted semi-structured interviews and pre-interview surveys with the representatives of model-participating POs and in-network hospices. In addition, we also interviewed the representatives of out-of-network (OON) hospices. The goal of these data collection activities was to help track Value-Based Insurance Design (VBID) implementation experiences and describe how and why VBID implementation was associated with key model outcomes. All interviews were conducted using an approach that we described in detail in our 2022 VBID evaluation report (Khodyakov et al., 2022). Some of the text below is copied verbatim from Appendix B of the 2022 report.

To recruit PO and hospice representatives, we reached out to contacts at each organization via email and provided them with a brief description of the interview, its purpose, and logistical details. We conducted follow-up outreach activities by email and phone with up to three attempts to reach those who had not responded to our invitations.

We used a small group approach to the interviews. We allowed contacts at each organization to invite colleagues who they considered to be most knowledgeable about VBID to participate in the interviews. During the scheduling phase, we sent the consent form via email. We obtained verbal consent and answered any questions prior to beginning the interview.

Each interview was conducted virtually using Zoom for Government software by a team that included up to two researchers and one research assistant who took detailed notes. All but two interviews were audio-recorded and professionally transcribed. Close-to-verbatim notes were taken during the interviews in which PO representatives declined to have their interview recorded. We provide additional descriptions of our sampling and data collection processes in the following section.

Sampling and Data Collection

Parent Organizations

We administered pre-interview surveys and conducted interviews with POs that participated in the model test in 2022 to understand their experiences with specific model components; the barriers that they encountered; and the impact that they expect their interventions will have on plan enrollment and retention, utilization of VBID benefits and services, beneficiary health outcomes, and plan and beneficiary costs in 2022. The questionnaires were developed after the

review of POs' model test application materials and informed by the results of the PO data collection activities undertaken in 2021. While the questionnaire questions were primarily close-ended, interview questions were open-ended.

Pre-interview questionnaires varied based on whether POs implemented VBID General or the Hospice Benefit component, but generally included the same type of questions. For example, while rating questions about VBID General implementation that were focused on various aspects of administrative processes and communication, Hospice participants also answered questions about challenges related to training, care delivery, and creating and maintaining a hospice network. Similarly, while all participants answered close-ended questions about how VBID will affect (or has already affected) a variety of plan- and beneficiary-level outcomes in 2022, Hospice participants also rated the impact of their interventions on utilization outcomes. In addition, Hospice participants answered questions about their VBID interventions.

During the interviews, we discussed POs' responses to the pre-interview surveys and asked additional questions covering such topics as

- details of VBID interventions
- implementation experiences, successes, and challenges
- intervention uptake among beneficiaries
- VBID's impact on plan enrollment, care quality, health, and financial outcomes.

The PO interview protocols varied based on whether it was a new or continuing PO; the new POs answered a longer set of questions that also covered such topics as

- reasons for joining the model test
- the process and reasons behind design and implementation decisions
- wellness and health care planning activities.

In July 2022, we invited all 35 POs that participated in the VBID Model test in 2022 to complete a brief online survey and participate in a two-hour semi-structured interview. POs could choose to complete one two-hour interview or schedule two separate hour-long interviews. Of the 35 invited POs,[1] 32 POs completed the survey (two POs that did not complete our survey implemented VBID General and another one implemented a Hospice component), and 27 POs completed the interview (16 implemented only VBID General, six implemented only the Hospice Benefit component, and five implemented both components). All PO interviews were completed between August and October 2022. During this time, we interviewed 118 PO representatives.

[1] Please note that for the purposes of primary data collection and analysis, we treat two POs that merged in 2022 as two separate entities because one of them continued its VBID participation in 2022 and another one joined the model test in 2022. Therefore, our count of POs is different for qualitative and quantitative analyses.

In- and Out-of-Network Hospices

We administered pre-interview surveys and conducted interviews with representatives of hospices that were part of PO hospice networks (*in-network* hospices) to understand which services they were contracted to provide as part of the Hospice component, challenges they faced implementing VBID hospice and factors that supported them to implement it, impacts of the Hospice component on their hospice, and their intent to participate in PO hospice networks in the future.

We also conducted interviews with representatives of hospices that were not a part of PO hospice networks (OON hospices) that implemented the Hospice component of the model test to understand their reasons for not joining a PO network and discuss their potential future participation in VBID.

Hospice interview protocols varied based on whether the hospice was in-network or OON and whether we had interviewed representatives from the hospice in the previous year. During interviews with in-network hospices, we discussed responses to the pre-interview surveys. In all interviews, we asked open-ended questions covering such topics as

- reasons for joining or not joining the hospice network of one or more POs participating in VBID Hospice
- the process of negotiating contracts and working with POs
- implementation experiences, successes, and challenges
- experiences working with the POs as an OON hospice
- changes in care delivery as a result of VBID Hospice
- thoughts about achieved and expected future outcomes of the model, including any unintended outcomes.

We assembled a diverse sample of in-network and OON hospices to achieve thematic saturation. We used hospice network lists that POs submitted to the Centers for Medicare & Medicaid Services (CMS) to identify in-network hospices. OON hospices were identified as those providing care in POs' service areas and having served at least one VBID beneficiary through July 2022. We excluded hospices that provided care to fewer than 50 beneficiaries in the prior year. We sorted both in-network and OON hospices for each PO in descending order by the number of VBID beneficiaries served and sequentially reached out to in-network and OON hospices for each PO. We prioritized hospices that provided care to VBID beneficiaries in both 2021 and 2022, as well as those that provided care to beneficiaries from more than one PO participating in the VBID Hospice component, either as in-network or OON.

To achieve our targeted number of ten in-network and eight OON hospice interviews, we contacted 29 in-network hospices and 31 OON hospices. We were able to schedule 45- to 60-minute interviews with representatives of 19 hospices. Of these, ten were in-network, eight were OON, and one was a chain that had both in-network and OON hospices. Across these hospices, we interviewed a total of 57 hospice representatives.

Between October and December 2022, we conducted interviews with a total of 57 hospice representatives, including 31 from in-network hospices, 17 from OON hospices, and nine from the chain that had both in-network and OON hospices. Interviewed hospices provided care to beneficiaries from nine of the 13 POs participating in the Hospice component of the model test in 2022 and were located in different parts of the country. Ten of the hospices were interviewed for the first time this year; the other nine had been interviewed in the prior year as well. Our hospice sample was diverse with regard to ownership status (ten were for-profit, six were nonprofit, and two had "other" profit status) and size (one hospice delivering care to between 101 and 249 Medicare beneficiaries per year, seven with 251 to 499 per year, and 11 hospices with 500 or more per year).

Data Analysis

We followed the same qualitative data analysis process as for the 2021 report (Khodyakov et al., 2022). Briefly, we used descriptive statistics to analyze responses from the PO and hospice pre-interview surveys to guide our qualitative analysis of the interview transcripts.

To code the interviews, we used a team-based approach and Dedoose, a qualitative software program. We began with the codebook used in the previous report and refined the codebook using revised interview questions and emerging themes from interviews conducted in 2022. We used the same process for training coders on how to use the codebook. Coders were able to achieve high reliability: The combined kappa score for interrater reliability for the PO interview coding was 0.82, as determined using the Dedoose feature (McHugh, 2012). After completing a coding reliability training, coders individually coded interview transcripts assigned to them; they met regularly to ask questions about coding and discuss any changes to the codebook that might be needed. To ensure consistency in analysis and interpretation of results, we assigned a single researcher to review relevant codes and write the response to each research question.

We used a thematic analysis (Guest, MacQueen, and Namey, 2012) to compare themes, identify the most-common responses to our interview questions, and explore patterns and variation in PO and hospice perspectives on and experiences with the model test. We also compared emerging themes from this evaluation with the findings from the 2021 evaluation and identified new themes specific to data collected in 2022 (for example, perspectives on the addition of the healthy food card benefit in 2022). Finally, in line with the mixed-methods nature of this evaluation, we integrated quantitative and qualitative analytic techniques to ensure the rigor of our findings. We note that because qualitative data focused on the perspectives of PO and hospice representatives on VBID implementation and outcomes in 2022 and the quantitative analyses used 2020, 2021, and/or 2022 data (depending on the outcomes), we present our qualitative findings as forward-looking results describing what PO and hospice representatives think about future outcomes of the model.

Appendix B. Beneficiary Interviews

Between June and September 2022, we conducted semi-structured telephone interviews with 150 beneficiaries who used VBID benefits to assess their experiences with supplemental benefits that were designed to address health-related social needs, the degree to which model benefits affected their selection of a health plan, or their experiences with palliative care delivered through the model. Interviews with beneficiaries were designed to provide a more comprehensive response to the following research questions:

- Were beneficiaries aware of their plan's intervention, how to access it, benefits for participating, or how to raise questions or concerns? What approaches are successful in engaging beneficiaries?
- What is the VBID uptake among targeted beneficiaries? How do POs measure engagement? Do VBID-participating beneficiaries report higher satisfaction? Why do beneficiaries opt out, and how does this vary?
- How does palliative care offered under VBID impact hospice utilization, revocation, length of stay, and beneficiary, family and/or caregiver perceptions of end-of-life care?

Sampling

To assess beneficiary experiences with VBID benefits designed to address health-related social needs, we sampled Low-Income Subsidy (LIS)–eligible beneficiaries enrolled in VBID General participating plans, restricting to plans that offer benefits designed to support social needs related to health, such as Cash Rebates and healthy food cards. Because there is no LIS designation in Puerto Rico, we sampled dual-eligible beneficiaries enrolled in plans with these same types of VBID General interventions. Our goal was to interview 120 beneficiaries across plans implementing VBID General that offer these benefits. To examine whether VBIG General benefits influenced beneficiaries' decisions to switch insurance providers, half of our target sample included beneficiaries who switched to a VBID-participating plan from another Medicare Advantage (MA) plan or from fee-for-service (FFS) Medicare for plan year 2022. To reduce the chance of including beneficiaries with cognitive impairments, we sampled beneficiaries who were younger than 80 and not enrolled in hospice or long-term care; to promote recruitment and ensure applicability of the interventions of interest, we sampled beneficiaries living in the community (that is, excluding those living in long-term care facilities).

To achieve our target of 120 completed interviews, we identified 1,030 beneficiaries enrolled in VBID General plans that offered benefits designed to address health-related social needs. We sampled an equal number of beneficiaries from all POs offering these benefits with the exception of the largest PO (PO P), from which we selected 30% of the sample. We also identified 1,567 beneficiaries from the same VBID General—participating plans who switched into those plans

from a non-VBID MA plan (*MA switchers*). Initially, we included (1) all beneficiaries from one PO that had just 15 beneficiaries, (2) 20% of switchers from PO P's VBID General plans because they had the highest enrollment, and (3) an equal number of beneficiaries across all other POs. As recruitment progressed, we sampled additional beneficiaries from POs from which no or few beneficiaries had been interviewed.

Finally, we identified a total of 514 beneficiaries who switched from FFS to the same set of VBID General MA plans for 2022 (*FFS switchers*). Initially, we included (1) all eligible beneficiaries from POs with 51 or fewer such beneficiaries, (2) 20% of FFS switchers in PO P, and (3) an equal number from all other POs. As recruitment progressed, we sampled additional beneficiaries from POs from which no or few beneficiaries had been interviewed.

To assess beneficiary experiences with palliative care delivered through the VBID Model, we set out to interview 30 beneficiaries who received such care. To identify eligible beneficiaries, we used PO-submitted data on beneficiaries who received palliative care as part of the model test in 2021. Because beneficiaries receiving palliative care may have cognitive or physical impairments that make it difficult to complete interviews independently and because some beneficiaries may have passed away, we included family caregivers instead of—or in addition to—beneficiaries when needed. To achieve our target of 30 completed interviews, we identified 776 beneficiaries across POs (including those operating in both the mainland United States and Puerto Rico), assuming that we would complete one interview for every 26 beneficiaries sampled.

To ensure that interviewees had sufficient experience with palliative care, we restricted the sample to those who received such care for at least eight days. We pulled a census of beneficiaries in POs with 80 or fewer beneficiaries who received palliative care and sampled proportionate to the total number of beneficiaries receiving palliative care from all other POs. To increase the likelihood that the beneficiaries were still alive and to select interviewees with more-recent palliative care experiences, we ordered sample lists for recruitment by recency of palliative care start date.

Recruitment Activities

To meet our sampling goals and to facilitate recruitment, we divided our recruitment efforts in waves and staggered recruitment activities. Our recruitment approach began with a mailed one-page letter to eligible beneficiaries. We called them several days after initial mailing. We allowed an average of five telephone calls to recruit each beneficiary to reduce respondent burden. During the second wave of recruitment, we mailed a revised, simplified letter that encouraged beneficiaries to call us if they were interested; this approach helped us recruit beneficiaries whose telephone numbers we were not able to obtain. The letter used bullet points to clearly note that beneficiaries would receive $50 for completing the interview, the interview would take only 30 minutes to complete, and the information would be kept confidential. For

beneficiaries in Puerto Rico, the letter was translated into Spanish. It included a direct phone number to a bilingual interviewer who could confirm beneficiary interview eligibility and conduct the interview on the spot without having to schedule for another day or time. This approach helped overcome challenges of reaching and scheduling beneficiaries in Puerto Rico.

When speaking with sampled beneficiaries over the phone, recruiters used a script that explained the interview purpose and length, reviewed confidentiality and the voluntary nature of research participation, and discussed audio recording procedures. If the beneficiary was interested and cognitively able to participate, the recruiter scheduled an interview and obtained some basic demographic information (ethnicity, education, and work status; for palliative care beneficiaries, main health conditions). For the palliative care beneficiaries, we also screened to identify a caregiver to interview on behalf of the beneficiary, if needed. All interviews were conducted in either English or Spanish and audio-recorded. To thank beneficiaries for their time, we sent them a $50 check after the interview was completed.

We sent an invitation letter to 3,887 potentially eligible participants. We also called 2,116 beneficiaries whose telephone numbers we were able to identify. Because we were not able to identify telephone numbers of any beneficiaries in Puerto Rico, we mailed 362 letters asking them to call us.

We were able to schedule 30-minute interviews with 186 beneficiaries. Of these, 150 beneficiaries completed the interview, nine declined to be interviewed when called at a previously scheduled time, and 27 could not be reached at the number provided and did not reschedule the interview. Ten interviews were conducted in Spanish.

Interview Guide

We created separate semi-structured interview guides, one that focused on VBID General benefits designed to address health-related social needs and reasons for switching to a VBID-participating plan and another one about palliative care experiences. Each guide included open-ended and close-ended questions, as well as probes and follow-up questions.

The interview guide focused on health-related social needs was tailored to the nuances of the VBID General benefits offered by each participating plan. Each beneficiary was asked a slightly different set of questions tailored to the benefits offered by their plan. The interview guide covered such topics as:

- awareness of VBID benefits
- utilization of VBID benefits
- expected impact of VBID benefits
- overall assessment of the participant's health plan.

A version of this guide for the interviews with beneficiaries who switched into VBID General participating plans in 2022 also covered reasons for switching and choosing a VBID plan.

A separate interview guide about palliative care included the following topics:

- awareness of palliative care
- palliative care experiences
- discussions about care options (for example, discussions about hospice)
- overall assessment of health plan.

Interview Process

All interviews were conducted by one of eight experienced interviewers. Two bilingual interviewers were assigned to conduct the Spanish language interviews. We conducted two training sessions for interviewers: one for each interview guide. Before each interview, the interviewer obtained oral informed consent and ascertained that the interviewee did not object to having the interview audio-recorded. Each interview lasted on average 30 minutes (ranging from 16 to 45 minutes) and was conducted using the approved protocol tailored to the benefits offered by the beneficiary's VBID-participating plan. All interviews were audio-recorded and transcribed verbatim; Spanish interviews were transcribed and translated.

Data Analysis

We used a rigorous Framework Method (Gale et al., 2013) to organize our interview data and conduct applied thematic analysis methodology to analyze them (Ryan and Barnard, 2003). Our analytic approach consisted of four steps. First, following each interview, the interviewer entered notes into a spreadsheet to create a matrix that included beneficiaries as rows, codes as columns, and summaries of a beneficiary response to a relevant interview question as cells. We created two separate matrices: one for interviews with beneficiaries who received services designed to help them address health-related social needs and/or switched plans, and another one for interviews conducted with beneficiaries who received palliative care and their caregivers. Second, after transcription of the audio recording was completed, the interviewer reviewed the transcripts to fill in any gaps in the interview summary and the transcript. Third, we reviewed the matrix for comprehensiveness and data saturation and discussed emerging themes regularly. Finally, we synthesized the findings, using sorting features for quantitative descriptions of study results (frequency counts) and thematic analysis to explain nuances within the data; this was similar to our approach to the analysis of PO and hospice interview data.

Participant Characteristics

Our final sample included 150 participants: 117 beneficiaries were interviewed about their experiences with the benefits that help address health-related social needs (of these, 36 were MA switchers and 29 were FFS switchers); 33 other interviews focused on palliative care experiences

(of these, 18 were conducted with beneficiaries and 14 with caregivers, and one interview was conducted with both the beneficiary and caregiver).

Overall, the majority of our interviewees were female (63%); however, we interviewed roughly the same number of males and females about their palliative care experiences (Table B.1). The palliative care sample was older (most beneficiaries were 75 years old or older), more educated (close to half of our interviewees had at least a college diploma), and more likely to be retired than the other sample that focused on health-related social needs. This is not surprising because the palliative care sample was sicker, and the other sample included only beneficiaries with low socioeconomic states (SES). Across both interview types, 57% of participants were White, 28% were Black or African American, and 12% were Hispanic. A notably higher proportion of palliative care participants were Hispanic, likely because of the number of palliative care beneficiaries from Puerto Rico.

Table B.1. Participant Characteristics

Characteristics	All Interviews (*N* = 150)	Health-Related Social Needs (*N* = 117)	Palliative Care (*N* = 33)
Gender			
Male	55 (37%)	38 (32%)	17 (52%)
Female	95 (63%)	79 (68%)	16 (48%)
Age			
< 65	57 (38%)	53 (45%)	4 (12%)
65–74	62 (41%)	53 (45%)	9 (27%)
75+	31 (21%)	11 (9%)	20 (61%)
Ethnicity			
Asian	3 (2%)	3 (3%)	0 (0%)
African American	42 (28%)	38 (32%)	4 (12%)
Hispanic	18 (12%)	9 (8%)	9 (27%)
White	86 (57%)	64 (55%)	22 (67%)
Native Hawaiian, other Pacific Islander	3 (2%)	2 (2%)	1 (3%)
American Indian and Alaska Native	1 (1%)	1 (1%)	0 (0%)
Other	6 (4%)	2 (2%)	4 (12%)
Education			
8th grade or less	8 (5%)	3 (3%)	5 (15%)
Some high school	17 (11%)	16 (14%)	1 (3%)
High school graduate	56 (37%)	53 (45%)	3 (9%)
Some college or a 2-year degree	36 (24%)	28 (24%)	8 (24%)
College degree	23 (15%)	12 (10%)	11 (33%)

Characteristics	All Interviews (*N* = 150)	Health-Related Social Needs (*N* = 117)	Palliative Care (*N* = 33)
Advanced college degree	10 (7%)	5 (4%)	5 (15%)
Employment status			
Working full- or part-time for pay	6 (4%)	6 (5%)	0 (0%)
Retired	76 (51%)	53 (45%)	23 (70%)
Doing volunteer work	2 (1%)	2 (2%)	0 (0%)
Taking care of kids	13 (9%)	10 (9%)	3 (9%)
Other work status	53 (35%)	46 (39%)	7 (21%)

Among the palliative care interviewees, the top three health conditions reported by palliative care beneficiaries were cancer (21%), angina or coronary artery disease (CAD) (15%) and stroke (15%). These beneficiaries also mentioned other co-morbidities, including Parkinson's disease, dementia, rheumatoid arthritis, lupus, and multiple sclerosis, among others. Most palliative care interviewees rated the beneficiary's health at the time they received palliative care as poor or fair *(N* =27), while a small number (*N* = 6) rated the beneficiary's health as good or very good.

Appendix C. Methods for Statistical Analysis

Our core analyses use the same analytic toolkit as our prior report (Khodyakov et al., 2022). For convenience, we reproduce a condensed discussion of those methods here, adapted to reflect any changes that have been made since the publication of the prior report. Some outcomes are analyzed at the contract level, others at the plan level, and still others at the beneficiary level. Our statistical approach uses methods that focus on isolating the short-term impact of VBID; there are separate analyses for VBID General and the Hospice component. We use the same methods to analyze VBID General regardless of the level at which the outcome was measured, although analyses at the beneficiary level are somewhat simpler because only one year of data were available after VBID implementation. For ease of explanation, we explain the VBID General methods in the following section as if the plan were the unit of analysis. We also include a discussion of hospice-related outcomes that use related but modified methods compared with the VBID General analyses.

VBID General Analyses

As described in the main report, VBID General encompasses a variety of intervention types, such as Rewards and Incentives (RI), reduced cost sharing for high-value services, and rebates. Our primary analyses do not differentiate these different subcomponents, but we also include select analyses of the individual subcomponents in Appendix E. The overall approach is a weighted difference-in-differences (DD) design to identify the effects of VBID participation. Our DD approach aligns most closely with that described in Callaway and Sant'Anna (2021), with modifications to allow for the inclusion of balancing weights and to accommodate the fact that some plans leave (and sometimes rejoin) the VBID Model test before its conclusion.

There are a few challenges to successfully estimating the average impact of VBID participation, given the observational nature of the VBID Model test. First, plans' fidelity of implementation and beneficiaries' uptake of the proposed intervention may be varied. For this reason, all analyses, unless otherwise noted, were based on the intention-to-treat principle—that is, plans were analyzed based on their proposed interventions regardless of fidelity or uptake. This allows us to estimate the effectiveness of VBID participation under real-world implementation of the interventions. We do not estimate the efficacy of the interventions, which would measure the effect of VBID participation under the ideal circumstances of perfect fidelity and uptake. Second, plans were allowed to join and leave the VBID Model test on a year-to-year basis, leading to different participation patterns. Finally, plans that chose to participate in the VBID Model might differ in both observable and unobservable ways from those that did not. To address these analytic concerns, this evaluation combines entropy-balancing (EB) on observables

with the DD framework established in Callaway and Sant'Anna (2021), which allows DD designs with differing patterns of participation. EB serves to bolster the DD design, which allows for differences (in both observable and unobservable characteristics) between VBID and comparison plans under certain assumptions.

Specifically, our DD framework relies on the estimation of a separate DD model for groups of participating plans, where the groups of plans are defined by their patterns of participation in the VBID Model test. The estimates from these separate DD models are combined to provide aggregate summaries of the effect of VBID participation. Each of the models requires the identification of a comparison group, and we use EB weights such that the weighted comparison group is as similar to the group of participating plans on observable characteristics as possible. This analytic strategy can be summarized into four distinct stages, which are described in detail in subsequent sections:

1. definition of groups of participating plans and the effects of interest
2. identification of nonparticipating plans that are eligible for VBID
3. construction of outcome-specific comparison groups using EB for each of the groups in stage 1 using the comparisons identified in stage 2
4. estimation and summarization of DD models using the comparison groups derived in stage 3.

Several POs participated in the Phase I (2017–2019) iteration of the model test and thus had matched comparators in the RAND Corporation's prior evaluation. We disregarded these previous matches for this evaluation because it uses a different analytic strategy from the previous evaluation. For the purposes of this evaluation, participation in the previous version of VBID was considered pre-participation activity. We assessed the effect of this version of VBID in isolation; thus, we estimated the effect of any additional changes to their interventions. Further discussion of this is provided at the end of this appendix.

Defining Groups of Participating Plans

We limited our analyses to Medicare Advantage–Prescription Drug (MAPD) plans because very few MA-only plans participated, and we expected substantial differences in the design and structure of MAPD and MA-only plans owing to Part D coverages. Analyses including MA-only plans were conducted as sensitivity analyses.

Here, we describe groups of plans implementing VBID General and corresponding effects of VBID General. Suppose plans are observed for time points $t = 2017, \ldots, 2022$ and let a_t be a binary indicator that is defined to be 1 if a plan participates in VBID in year t and 0 otherwise. We assume that 2020 is the first year that plans are eligible to participate in the VBID Model test, and we consider participation in Phase I of VBID (2017–2019) as pre-participation activity. Define $y_{it}(\boldsymbol{a})$ for $2017 \leq t \leq 2022$ as the outcome that would have been observed for unit *i* at time *t* if the unit follows the VBID General participation pattern $\boldsymbol{a} = (a_{2020}, a_{2021}, a_{2022})$. There are eight possible VBID General participation patterns $\boldsymbol{a}$ as of 2022 for plans in existence for all

three years, corresponding to all possible combinations of 0s and 1s for the three elements of $\boldsymbol{a}$. We also observe one additional pattern for analysis where a plan was not in existence in 2020, did not participate in VBID in 2021, but did participate in 2022.

Plans that participated only in the Hospice component are considered comparison plans for the evaluation of VBID General because plans could opt to participate in VBID General only, the Hospice component only, or both. The group of plans that discontinued participation in VBID General at some point (for example, plans that participated only in 2020) represents a potential analytic concern because it is a departure from the existing DD literature in terms of staggered adoption. Existing methods for DD with multiple adoption points either explicitly or implicitly assume that once one is participating, one is always participating, and DD does not allow for discontinuation of an intervention. To allow for this possibility, we extend the methodology of Callaway and Sant'Anna (2021) to allow for discontinuations. Note that effects were not estimated for this group after discontinuation.

We define average treatment effects for each VBID General participation history $\boldsymbol{A} = \boldsymbol{a}$ against the comparison group of nonparticipants as

$$ATT(\boldsymbol{a}, t) = E[y_{it}(a) - y_{it}(0) | \boldsymbol{A} = \boldsymbol{a}]. \qquad \text{(Equation C.1)}$$

These $ATT(\boldsymbol{a}, t)$ can be estimated using comparisons between a group of participating plans defined by the VBID General participation pattern $\boldsymbol{A} = \boldsymbol{a}$ and a group with $\boldsymbol{A} = \boldsymbol{0}$. These estimates can then be used as the building blocks for different overall effects that summarize the group-time effects, that is,

$$\sum_{a \in \mathcal{A}} \sum_{t=2020}^{2022} w(\boldsymbol{a}, t) \cdot ATT(\boldsymbol{a}, t) \qquad \text{(Equation C.2)}$$

where $\mathcal{A}$ represents all possible participation histories and $w(\boldsymbol{a}, t)$ represents a set of weights. The choice of $w(\boldsymbol{a}, t)$ can be varied to answer different research questions. While this framework allows for arbitrary choices of w, we consider two definitions that facilitate interpretation for this evaluation. We consider the following two types of aggregated effects:

1. The effect of participating *e* time periods after initial adoption among those that participated for at least *e* time periods. These effects allow us to estimate how the effect of VBID General participation changes over time as plans gain experience with the model test and the set of participating plans changes. In this case, the weights $w(\boldsymbol{a}, t)$, are defined as the proportion of plans in each group among those plans that participated for at least *e* time periods.
2. The effect in year *t* among plans participating in year *t.* These effects allow us to estimate the average effect of VBID General participation in each calendar year across all participating plans in that year. In this case, the weights, $w(\boldsymbol{a}, t)$, are defined as the proportion of plans in each group among plans that participated in year *t*.

Interpretation of Aggregate VBID General Effects

The previously defined effects can be used to address different policy questions, and thus we provide some guidance for the interpretation of two example aggregate effects of VBID General. Note that all effects of VBID General are estimated relative to a balanced comparison group that did not participate in VBID General in either year. The effects are as follows:

- **Effect of VBID General in the first year of participation:** This is the average effect of VBID General during the first year of implementation among plans that participated in VBID General in 2020, 2021, or 2022. Thus, this effect contains all plans implementing VBID General and evaluates their effect at a common relative time point.
- **Effect of VBID General in 2022:** This is the average effect of VBID General in 2022 among all plans that participated in 2022, representing the overall effectiveness of VBID General in 2022 among plans that participated in VBID General in 2022. Note that this averages the effect in 2022 of plans that participated in VBID General for only a single year (plans that participated only in 2022) and plans that participated in VBID General for two or more years (for example, plans that participated in 2020–2022 or 2021–2022).

There is no guarantee that either of these effects will generalize to future years or match the effect of prior years because of the changing landscape of participation in VBID General.

Entropy-Balancing for Outcome-Specific Comparison Groups

In this section, we describe the tools we used for finding comparable groups for each group of participating plans defined by their participation pattern, $\boldsymbol{a} = (a_{2020}, a_{2021}, a_{2022})$. Plans volunteered to participate in VBID, and those that did so differed from eligible nonparticipating plans with respect to many observable characteristics. We sought to construct comparison groups to minimize these differences to improve comparability between the groups and justify the key assumptions of our DD regression models.

Briefly, we use an EB approach, which increases comparability on observables between the VBID participating and eligible nonparticipating plans by weighting the nonparticipating plans to be more similar to the VBID group. To select the weights, we implemented an optimization approach that constrains the *SMD*—a measure of comparability between groups—to be small. Although balancing on higher-order terms (for example, squared terms) can improve treatment effect estimates, balancing means for a large number of potential confounders already stretches what is possible while maintaining reasonable effective sample sizes. That said, because our analytic design incorporates DD analysis, we are not as concerned about deficiencies in balance as we would be if the entire identification strategy depended on covariate balance. The optimization algorithm requires a data set with no missing data, so we used a simple imputation process to fill in missing values within study years because missingness rates overall were low (typically much less than 1 percentage point). (See Khodyakov et al., 2022, for more details on the imputation approach.) Note that this imputation process was used only for the derivation of weights and was not used when fitting the DD models. In the following section, we describe the

EB steps in more detail, including a discussion of why we selected the EB approach as opposed to other matching approaches, and how we settled on the SMD as the metric for assessing comparability.

Matching Versus Entropy-Balancing

For readers more familiar with matching methods in observational studies and less familiar with the weighting approaches (that is, EB) that we implemented, we provide a brief discussion on how these two methods are related. Matching and weighting are popular methods for selecting comparison groups. For example, a 1:1 propensity score matching *without* replacement assigns each member of the comparison group a weight of 0 or 1, depending on whether the member was identified as a match. A 1:1 propensity score matching *with* replacement assigns each member of the comparison group a weight equal to the number of times it was matched (0, 1, 2, 3, . . .). In this view, *matching is equivalent to a weighting approach that constrains the weights to be integers.* An analogous propensity score weighting approach would simply allow the weights to be nonintegers, effectively up-weighting or down-weighting comparison group members in a more continuous fashion than matching. With this view, matching and weighting approaches share more similarities than differences, and weighting offers more flexibility than matching by allowing for noninteger weights and often can provide considerable computational advantages. EB is one such weighting approach.

A primary benefit of EB over other approaches is that the analyst can have more fine-grained control over the characteristics of the weighted sample than with a matched sample. For example, in our analyses, we implement an EB procedure that uses optimization to select weights subject to constraints on the balance of the distributions between treated and control groups. Because the procedure explicitly specifies the balance constraints in the optimization, it can ensure that we select a weighted sample that meets our needs. Conversely, matching is done by choosing individuals with similar characteristics and evaluating the balance of the distributions as a post-hoc procedure. Checking balance in this way makes it difficult to adjust the analysis when an insufficient matching is found. A detailed description of EB is provided in the subsequent sections.

Defining Measures of Similarity

A critical portion of the estimation strategy is finding balancing weights such that the weighted distribution of observable characteristics (for example, for-profit status) in comparison plans is similar to the characteristics in the participating plans. We define the similarity between each group of participating plans in VBID General and the comparison plans using the standardized mean difference (SMD) between each group's covariate distributions. For a particular covariate X, the SMD is defined as the mean in the treated group minus the weighted mean in the control group, all divided by the standard deviation in the treated group. Hence, a

SMD of 0 means that the mean of the covariate for the treated observations is equal to the weighted mean of the control observations.

Weight Selection: Entropy-Balancing Algorithm

There are many methods for estimating weights to balance observable characteristics between two groups. These include indirect methods, such as propensity scores–weighting (Hernán and Robins, 2010; Imbens and Rubin, 2015; Pearl, Glymour and Jewell, 2016) and direct methods, such as stable balancing weights (Zubizarreta, 2015), covariate balancing propensity score (Imai and Ratkovic, 2014), and entropy balancing (EB) (Hainmueller, 2012). For this evaluation, we used EB, an optimization-based method of obtaining weights, because it allowed us to prespecify balance constraints on the distribution of the observable characteristics. Standard EB aims to produce weights that exactly balance the covariates included in the weighting process. As in Khodyakov et al., 2022, we modified the standard EB algorithm to weights that balance the covariates within a pre-specified range of SMDs. For example, we can estimate weights that consider any SMD with an absolute value below $\delta = 0.1$ to be balanced. This implementation of EB represents a departure from the original (Hainmueller, 2012) methodology by not requiring the constraint on the SMDs to be set to zero. Choosing δ represents a trade-off between bias and variance (Wang and Zubizarreta, 2020), and the amount of information in the weighted sample can be measured using Kish's effective sample size (Kish, 1965), which is defined as $ESS(w) = \sum(w_i)^2 / \sum w_i^2$.

The effective sample size (ESS) can range from 1 to the original sample N. A low effective sample size implies that there may be insufficient information in the sample and that it is difficult to find comparable units between the two groups. Larger values of δ will lead to larger effective sample sizes, but this comes at the cost of balance between the groups. In practice, SMD values lower than $\delta = 0.1$ are customarily used (Austin, 2009; Stuart, Lee, and Leacy, 2013) when the goal of balancing is to fully control for confounding.

Implementation of Entropy-Balancing

We used EB to derive a weighted comparison group separately for each outcome and each group of plans implementing VBID General, as defined in Table C.1. In particular, EB was used to balance a set of observable pre-participation characteristics, including pre-participation outcome trends. We note that there has been significant discussion on weighting and matching on pre-treatment trends, including the potential to admit bias into estimation; for example, refer to discussions in Daw and Hatfield (2018) and Zeldow and Hatfield (2021). Our decision to balance pre-participation plan characteristics and outcome trends is based on results from several studies. First, the decision to balance plan characteristics is supported by Zeldow and Hatfield (2021). An exploratory data analysis indicated that our plan characteristics trends are roughly parallel over time, and, based on Zeldow and Hatfield (2021), balancing pre-participation characteristics is approximately unbiased in these situations. Second, we were concerned about

additional unexplained differences in outcome trends (after balancing the pre-participation characteristics), so we balanced pre-participation outcome trends. Several simulation studies have shown that balancing pre-period outcome trends reduces bias in DD models relative to the unadjusted DD (Arkhangelsky et al., 2021; Daw and Hatfield, 2018; Lindner and McConnell, 2019). These studies have shown that balancing outcome trends does not increase bias—simulations that show increased bias after balancing are limited to approaches that balance outcome levels. We avoided balancing on pre-intervention outcome levels to avoid the possibility of bias in our DD models because of regression to the mean, and we proceeded with balancing pre-participation outcome trends.

We balanced the VBID and comparison groups using a variety of pre-participation characteristics, including beneficiary demographics, plan characteristics, characteristics of the local health care market, and pre-intervention outcome trends (the first differences of the outcome over time). As in the previous report, we balanced characteristics in the final pre-intervention year, except for the outcome trends, all of which were included in balancing. Table D.1 provides the full set of characteristics that were included in our EB approach. To select δ, we attempted to find the smallest value of δ that provided an effective sample size from the comparison plans that was approximately equal to the sample size in the group of participating plans. In some cases, very small participation patterns were difficult to balance because of their small sample size and idiosyncrasy. In these cases, we considered dropping some characteristics from the balancing to ensure better balance on key characteristics. These cases do not have a large effect on the final results because our final estimates do not appear to be sensitive to moderate changes in the balancing weights and because small participation patterns contribute less to aggregated estimates.

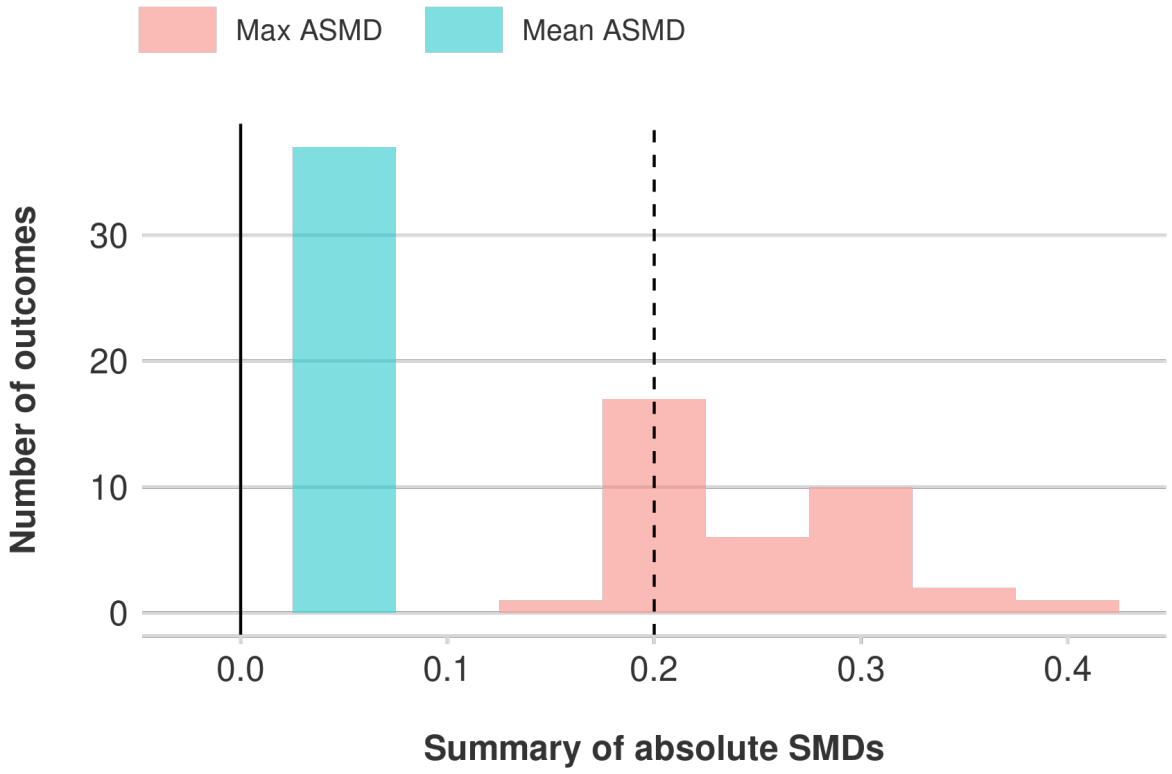
Details on the Results of Entropy-Balancing

Figures C.1 through C.3 show the mean and maximum absolute SMDs across outcomes used in the main analyses. Figure C.1 aggregates information across a large number of balancing characteristics and participation patterns to obtain a single summary balancing statistic for each plan-level outcome. First, for each outcome, the weighted SMD for each balancing characteristic was computed as a weighted average across all participation patterns—smaller participation patterns contributed less to this statistic because they also contributed less to the overall analysis. Next, the mean of the absolute value of each of these weighted SMDs (across all balancing characteristics) was computed for each outcome. This statistic shows how similar on average participating plans are to their weighted comparison plans on all balancing characteristics for a given outcome. Finally, the maximum of the absolute values of the weighted SMDs was computed to show the worst-case differences between VBID and comparison plans for a given outcome.

Figure C.1 shows that mean absolute SMDs (ASMDs) are universally small, demonstrating that differences between VBID plans and weighted comparison groups are generally quite small.

However, maximum ASMDs can be high in some cases, but these are driven by a single geographic characteristic in which both treated and control plans have very few beneficiaries. A very large ASMD is observed for situations in which VBID plans have on average 0.02% of beneficiaries in this region, and weighted comparison plans have 0.10%. Outside this variable, only one ASMD was larger than 0.23 for any characteristic for any outcome.

Figure C.1. Balancing Summary Statistics for All Plan-Level Primary VBID General Analyses



We show the same summary statistics for contract-level analyses in Figure C.2. Contract-level analyses tended to have slightly higher mean ASMDs than the plan-level analyses because of the smaller number of contracts and the difficulty of achieving a very precise balance on as many characteristics, but no maximum ASMDs were larger than 0.2.

Figure C.2. Balancing Summary Statistics for All Contract-Level Primary VBID General Analyses

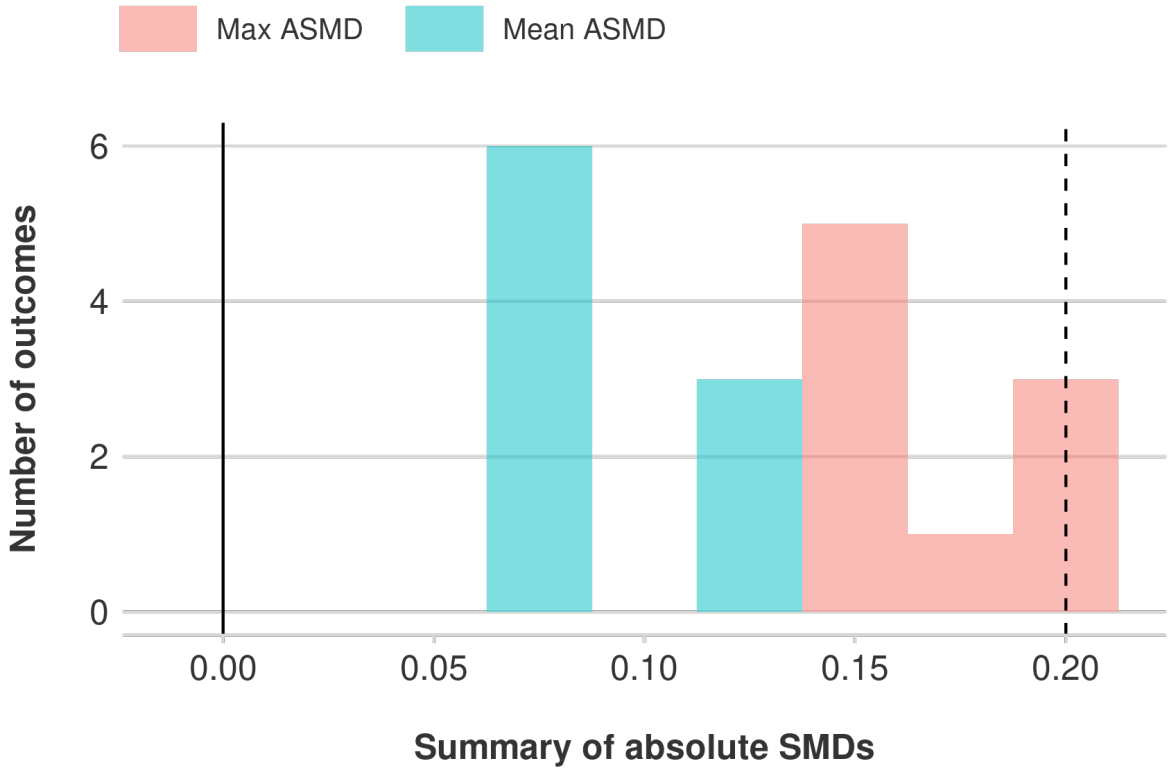
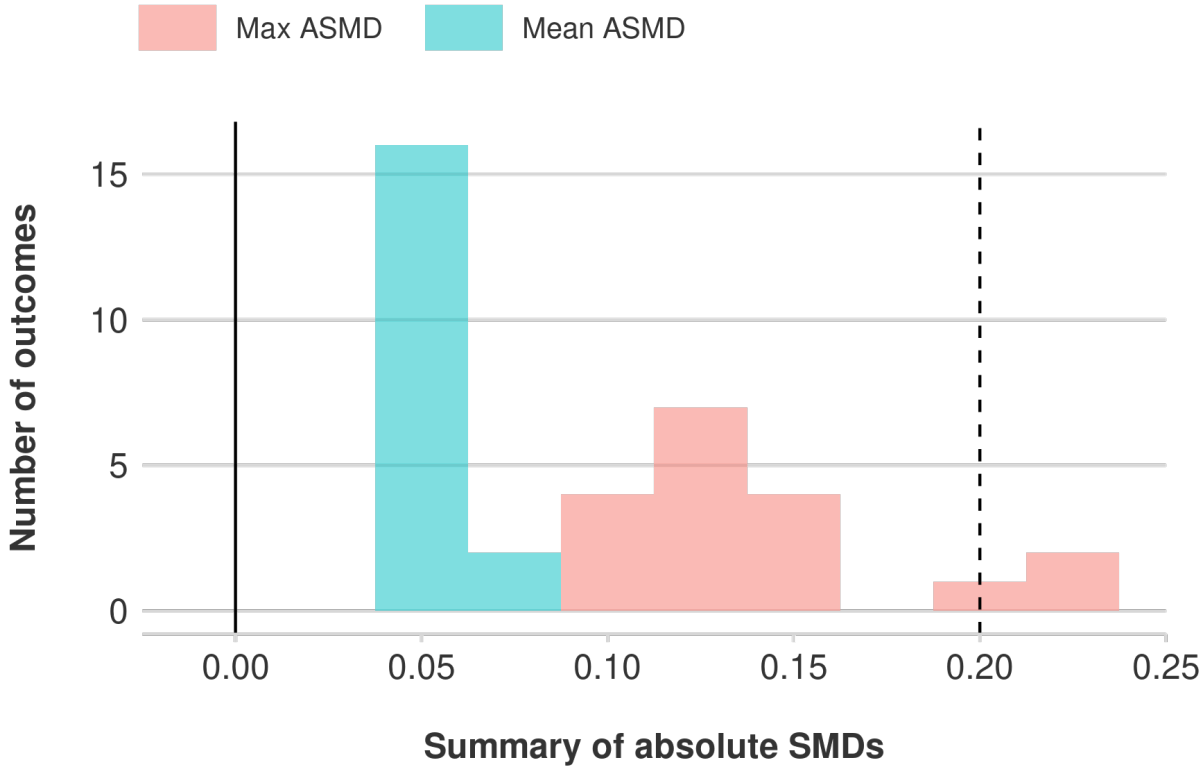


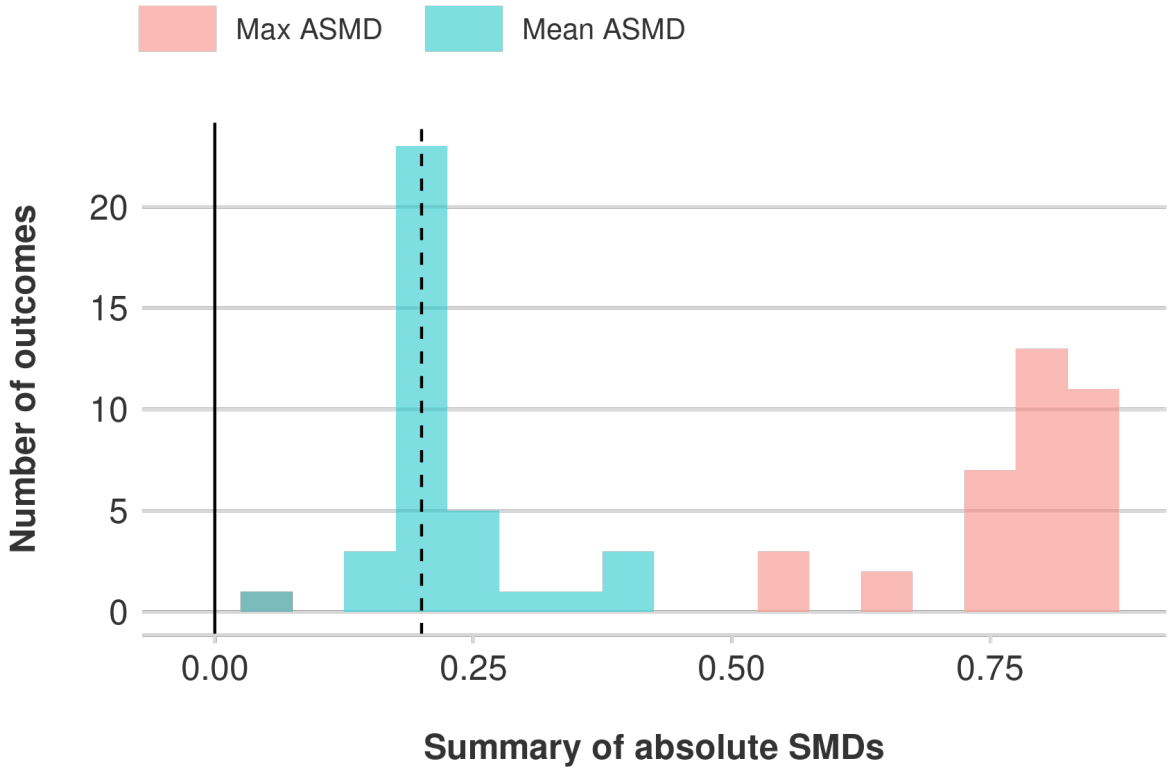
Figure C.3 gives the same summary statistics for the beneficiary-level analyses. Because of the large number of beneficiaries, balancing for the beneficiary-level analyses was generally much easier and more uniform. All mean ASMDs for beneficiary-level analyses were less than 0.1, and all maximum ASMDs were less than 0.25.

Figure C.3. Balancing Summary Statistics for All Beneficiary-Level Primary VBID General Analyses



Finally, in Figure C.4, we show the generally poor balance obtained for hospice plan–level analyses. Unlike VBID General plans, hospice plans are very different from comparison plans, and the resulting balance was typically poor. Because we believe that achieving balance should make the assumptions necessary to identify causal effects in DD models more plausible, the fact that we do not obtain balance reduces our confidence in these plan-level hospice analyses.

Figure C.4. Balancing Summary Statistics for All Plan-Level Primary Hospice Analyses



The previous figures give a high-level overview of the balance achieved in our analyses. We now illustrate, in more detail, three examples of how the EB worked. One example is for a larger participation pattern at the plan level (where better balance was achieved), another example was for a smaller participation pattern (where balance was worse), and the other example is an analysis at the beneficiary level (where better balance was achieved). In all cases, we show how EB created a weighted sample such that plan or beneficiary characteristics were brought into better balance (up to a specified tolerance) between the VBID group and the weighted comparison group. These examples were chosen without respect to the results of the balancing but just as illustrative examples.

The plan-level examples include data for the analysis of MAPD bids for plans, with the first example being for the participation pattern defined by plans that joined VBID in 2022. First, in Table C.1, consider the comparison between the weighted and unweighted samples in terms of the ASMD between the two groups. ASMDs could be as large as 1.1 standard deviations in the absence of weighting, but they were reduced to no larger than 0.05 standard deviations after EB.

Table C.1. Exemplar Comparison of Aggregate Plan Characteristics Before and After Entropy-Balancing (MAPD Bids, VBID General, 2022 Cohort)

Characteristic	UWgt Comp Mean	Wgt Comp Mean	UWgt VBID Mean	UWgt ASMD	Wgt ASMD
Plan characteristics					
For-profit status	0.72	0.93	0.94	0.98	0.05
Contract Star Rating	3.91	3.96	3.98	0.20	0.05
Moved into bonus payment	0.03	0.01	0.01	0.21	0.05
Moved out of bonus payment	0.09	0.04	0.03	0.30	0.01
Part C in-network OOP maximum	5,077.70	5,373.10	5,473.01	0.20	0.05
Part D basic premiums	16.52	17.89	18.68	0.14	0.05
Part D supplemental premiums	1.09	0.27	0.19	0.58	0.05
Part D total premiums	17.61	18.15	18.87	0.08	0.04
PPO	0.27	0.29	0.26	0.02	0.05
C-SNP	0.05	0.04	0.03	0.11	0.05
D-SNP	0.09	0.34	0.36	0.57	0.05
I-SNP	0.04	0.03	0.00	—	—
Area characteristics at the plan level					
Percent rural	5.71	6.60	6.32	0.06	0.03
Percent suburban	16.61	17.97	17.18	0.04	0.05
Percent urban	77.69	75.43	76.50	0.05	0.05
Median income	31,154.45	28,727.58	28,463.38	0.51	0.05
MA penetration	46.81	46.66	46.76	0.00	0.01
HPSA	0.01	0.02	0.03	0.14	0.05
Standardized Medicare costs per capita	10,473.67	10,945.20	10,890.97	0.28	0.04
Percent over 65	16.60	16.95	17.14	0.14	0.05
Puerto Rico county	0.01	0.04	0.05	0.21	0.05
Percent MA region 1	1.51	1.03	0.63	0.11	0.05
Percent MA region 2	2.93	1.43	0.95	0.20	0.05
Percent MA region 3	6.42	0.60	0.32	1.09	0.05
Percent MA region 4	1.81	1.03	0.63	0.15	0.05
Percent MA region 5	1.07	1.42	0.94	0.01	0.05
Percent MA region 6	5.89	3.94	3.09	0.16	0.05
Percent MA region 7	3.76	8.88	10.40	0.22	0.05
Percent MA region 8	3.43	5.07	4.72	0.06	0.02

Characteristic	UWgt Comp Mean	Wgt Comp Mean	UWgt VBID Mean	UWgt ASMD	Wgt ASMD
Percent MA region 9	12.33	20.36	19.58	0.18	0.02
Percent MA region 10	3.80	1.82	1.27	0.23	0.05
Percent MA region 11	2.22	1.03	0.63	0.20	0.05
Percent MA region 12	4.11	4.23	5.34	0.06	0.05
Percent MA region 13	2.71	4.46	4.82	0.10	0.02
Percent MA region 14	5.80	5.22	4.24	0.08	0.05
Percent MA region 15	2.90	4.75	4.93	0.10	0.01
Percent MA region 16	1.66	6.25	7.57	0.22	0.05
Percent MA region 17	4.16	6.61	6.01	0.08	0.03
Percent MA region 18	1.34	2.87	3.77	0.14	0.05
Percent MA region 19	2.35	3.38	4.39	0.10	0.05
Percent MA region 20	1.97	2.91	2.52	0.04	0.02
Percent MA region 21	2.03	3.39	4.42	0.12	0.05
Percent MA region 22	1.20	0.36	0.32	0.16	0.01
Percent MA region 23	9.28	1.44	0.95	0.86	0.05
Percent MA region 24	13.93	3.31	2.52	0.73	0.05
Percent MA region 27	0.52	3.95	5.05	0.21	0.05
Individual characteristics					
Average age	71.06	68.68	68.50	0.62	0.04
Percent male	0.44	0.44	0.44	0.14	0.00
Percent AI/AN	0.00	0.01	0.01	0.22	0.04
Percent API	0.04	0.02	0.02	0.61	0.05
Percent Black	0.11	0.17	0.16	0.42	0.05
Percent Hispanic	0.12	0.17	0.18	0.26	0.05
Percent multirace	0.02	0.02	0.02	0.44	0.03
Percent White	0.63	0.52	0.52	0.41	0.01
Percent dually eligible for Medicaid	0.23	0.47	0.47	0.58	0.01
Percent LIS	0.29	0.51	0.51	0.55	0.00
Percent disabled	0.27	0.39	0.40	0.79	0.05
Average MA risk score	1.45	1.59	1.60	0.43	0.01
Average Part D risk score	0.99	1.20	1.18	0.63	0.04
Percent cancer	0.10	0.09	0.09	0.18	0.02
Percent CHF	0.03	0.04	0.04	0.43	0.05
Percent COPD	0.00	0.00	0.00	0.36	0.05
Percent diabetes	0.30	0.35	0.36	0.51	0.05

SOURCE: RAND analysis of VBID-participating plan and other data. The complete list of data sources and variables is in Appendix D.
NOTE: AI/AN = American Indian and Alaska Native; API = Asian or Pacific Islander; CHF = congestive heart failure; Comp = comparison; COPD = chronic obstructive pulmonary disease; C-SNP = chronic condition special needs plan; D-SNP = dual eligible special needs plan; HPSA = health professional shortage area; I-SNP = institutional special needs plan; OOP = out of pocket; PPO = Preferred Provider Organization; UWgt = unweighted; Wgt = weighted.

We also give an example for a smaller participation pattern—those plans that joined VBID in 2020, discontinued participation in 2021, and rejoined in 2022, of which there were only 7. Because this participation pattern was so small, it was impossible to obtain balance on all of the characteristics that we would otherwise like to balance. However, because this participation pattern was so small, it did not contribute very much to our DD estimates and exerts little influence on the overall summaries of balance shown in Table C.2.

Table C.2. Exemplar Comparison of Aggregate Plan Characteristics Before and After Entropy-Balancing, Smaller Participation Pattern (MAPD Bids, VBID General, VBID 2020 and 2022, No VBID 2021)

Characteristic	UWgt Comp Mean	Wgt Comp Mean	UWgt VBID Mean	UWgt ASMD	Wgt ASMD
Plan characteristics					
For-profit status	0.72	0.80	0.86	0.37	0.15
Contract Star Rating	3.92	4.01	4.29	0.93	0.69
Moved into bonus payment	0.17	0.22	0.14	0.07	0.20
Moved out of bonus payment	0.06	0.03	0.00	—	—
Part C in-network OOP maximum	5094.25	4780.34	3964.29	0.80	0.58
Part D basic premiums	18.06	18.61	8.87	0.58	0.61
Part D supplemental premiums	1.29	1.05	0.00	—	—
Part D total premiums	19.36	19.84	5.57	0.94	0.97
PPO	0.27	0.13	0.00	—	—
C-SNP	0.05	0.04	0.00	—	—
D-SNP	0.11	0.49	0.86	1.99	0.97
I-SNP	0.04	0.03	0.00	—	—
Area characteristics at the plan level					
Percent rural	4.73	2.14	0.94	3.09	0.98
Percent suburban	15.03	9.07	7.33	2.28	0.52
Percent urban	80.06	88.32	93.12	2.64	0.97
Median income	31131.73	28234.25	20645.45	1.13	0.82
MA penetration	41.79	55.90	68.78	2.05	0.98
HPSA	0.01	0.00	0.00	—	—

Characteristic	UWgt Comp Mean	Wgt Comp Mean	UWgt VBID Mean	UWgt ASMD	Wgt ASMD
Standardized Medicare costs per capita	10,475.47	11,693.43	11,672.05	0.70	0.01
Percent over 65	16.56	17.21	17.81	0.55	0.26
Puerto Rico county	0.01	0.11	0.57	1.05	0.87
Percent MA region 1	1.51	0.01	0.00	230.17	0.97
Percent MA region 2	2.74	1.05	0.00	—	—
Percent MA region 3	6.94	15.37	28.57	0.44	0.27
Percent MA region 4	1.80	1.05	0.00	—	—
Percent MA region 5	1.29	0.84	0.00	—	—
Percent MA region 6	6.19	1.05	0.00	—	—
Percent MA region 7	3.86	0.00	0.00	2,255.36	0.97
Percent MA region 8	3.42	1.05	0.00	—	—
Percent MA region 9	12.02	37.53	14.28	0.06	0.62
Percent MA region 10	3.69	1.05	0.00	—	—
Percent MA region 11	2.07	1.05	0.00	—	—
Percent MA region 12	3.78	5.01	14.26	0.28	0.25
Percent MA region 13	2.72	1.05	0.00	—	—
Percent MA region 14	6.14	1.05	0.00	—	—
Percent MA region 15	2.75	1.05	0.00	—	—
Percent MA region 16	1.61	0.00	0.00	3,494.81	0.95
Percent MA region 17	4.84	1.05	0.00	—	—
Percent MA region 18	1.40	0.85	0.00	—	—
Percent MA region 19	2.37	1.05	0.00	—	—
Percent MA region 20	1.80	1.05	0.00	—	—
Percent MA region 21	2.05	1.05	0.00	—	—
Percent MA region 22	1.67	1.05	0.00	—	—
Percent MA region 23	9.55	0.00	0.00	72,576.92	0.97
Percent MA region 24	12.79	1.05	0.00	—	—
Percent MA region 27	0.94	10.67	57.14	1.05	0.87
Individual characteristics					
Average age	70.53	69.20	69.91	0.13	0.15
Percent male	0.44	0.44	0.43	0.07	0.03
Percent AI/AN	0.00	0.00	0.00	0.90	0.67
Percent API	0.04	0.04	0.02	0.71	0.65
Percent Black	0.12	0.17	0.09	0.20	0.55
Percent Hispanic	0.13	0.31	0.63	1.26	0.81

Characteristic	UWgt Comp Mean	Wgt Comp Mean	UWgt VBID Mean	UWgt ASMD	Wgt ASMD
Percent multirace	0.02	0.02	0.01	0.79	0.82
Percent White	0.66	0.42	0.19	1.72	0.84
Percent dually eligible for Medicaid	0.25	0.51	0.73	1.10	0.49
Percent LIS	0.32	0.48	0.20	0.33	0.80
Percent disabled	0.29	0.34	0.41	0.90	0.50
Average MA risk score	1.31	1.53	1.86	0.74	0.44
Average Part D risk score	1.08	1.27	1.49	1.17	0.63
Percent cancer	0.10	0.11	0.11	0.20	0.14
Percent CHF	0.16	0.20	0.26	1.00	0.61
Percent COPD	0.18	0.21	0.22	0.45	0.10
Percent diabetes	0.32	0.37	0.44	1.60	0.96

SOURCE: RAND analysis of VBID-participating plan and other data. The complete list of data sources and variables is in Appendix D.

Table C.3 gives the corresponding balance table for characteristics used to balance VBID General and comparison beneficiaries in the analysis of inpatient stays. Note that ASMDs between VBID plans and the unweighted comparison group could be as large as 0.9 standard deviations, but after weighting, they were virtually all no larger than 0.1 standard deviations.

Table C.3. Exemplar Comparison of Aggregate Beneficiary Characteristics Before and After Entropy-Balancing (Inpatient Stays, VBID General, 2020 Cohort)

Characteristic	UWgt Comp Mean	Wgt Comp Mean	UWgt VBID Mean	UWgt ASMD	Wgt ASMD
County-level characteristics					
Median income	31,465.14	30,175.51	29,755.58	0.30	0.07
MA penetration rate	44.46	44.08	45.39	0.07	0.10
Urbanicity	1.87	1.88	1.86	0.01	0.04
HPSA	1.86	1.87	1.84	0.05	0.06
Standardized Medicare costs per capita	10,705.30	11,077.58	10,993.44	0.20	0.06
Percent over 65	16.15	16.87	17.31	0.26	0.10
Puerto Rico	0.00	0.01	0.02	0.15	0.10
Social deprivation index (percentile)	144.01 (46.20)	156.16 (51.02)	150.90 (48.62)	0.12 (0.10)	0.09 (0.10)
Percent did not work, age 16 to 64	0.30	0.32	0.31	0.17	0.06

Characteristic	UWgt Comp Mean	Wgt Comp Mean	UWgt VBID Mean	UWgt ASMD	Wgt ASMD
Percent over 65, Black	1.30	1.83	1.97	0.35	0.07
Percent disabled, age 16 to 64	10.38	11.14	11.51	0.31	0.10
Percent non-Hispanic Black	0.11	0.15	0.17	0.37	0.10
Total (MAPD and PDP) LIS enrollees in 2021 as percent of total Medicare enrollment	0.23	0.23	0.22	0.03	0.10
MAPD LIS enrollees in 2021 as percent of total Medicare enrollment	0.11	0.12	0.12	0.16	0.02
PO- and contract-level characteristics					
Blue Cross and/or Blue Shield affiliate	0.19	0.06	0.04	0.79	0.10
For-profit status	0.66	0.88	0.91	0.89	0.10
State/regional/national	1.29	1.55	1.60	0.38	0.05
PO enrollment	1,450,794.04	1,061,732.98	981486.76	0.58	0.10
Star rating	4.07	3.99	3.93	0.25	0.10
Plan-level characteristics					
Plan enrollment	32,116.89	20,137.65	19,833.19	0.66	0.02
MA premium	13.00	6.95	5.11	0.43	0.10
Part D basic premium	14.52	13.42	14.81	0.02	0.09
Part D supplemental premium	0.87	2.36	3.22	0.27	0.10
Part D total premium	15.39	15.79	18.02	0.12	0.10
MA rebate dollars amount	112.50	121.48	116.32	0.06	0.09
Offers Part D	1.00	1.00	1.00	—	—
Part C in-network OOP maximum	5,001.46	4,962.48	5,118.01	0.07	0.10
PPO	0.26	0.09	0.06	0.81	0.10
C-SNP	0.03	0.01	0.00	0.45	0.10
D-SNP	0.07	0.22	0.27	0.44	0.10
I-SNP	0.00	0.00	0.00	—	—
MA bid	775.50	767.43	773.20	0.03	0.08
Part D bid	49.80	42.99	41.77	0.66	0.10
Cost of MSB	22.54	29.67	30.67	0.37	0.04
Administrative costs	104.09	116.58	114.61	0.53	0.10
Beneficiary-level characteristics					
Age	72.74	71.48	71.31	0.13	0.02

Characteristic	UWgt Comp Mean	Wgt Comp Mean	UWgt VBID Mean	UWgt ASMD	Wgt ASMD
Male	0.44	0.43	0.43	0.02	0.01
Black	0.10	0.19	0.21	0.28	0.04
Hispanic	0.13	0.13	0.10	0.10	0.10
API	0.05	0.04	0.03	0.13	0.10
AI/AN	0.00	0.00	0.00	0.01	0.01
Multirace	0.02	0.02	0.03	0.28	0.07
White	0.70	0.61	0.63	0.15	0.05
Dual	0.17	0.34	0.39	0.45	0.10
LIS levels 1–4	0.23	0.41	0.46	0.45	0.09
LIS level 1	0.12	0.21	0.25	0.29	0.08
LIS level 2	0.07	0.14	0.14	0.20	0.00
LIS level 3	0.02	0.03	0.04	0.07	0.03
LIS level 4	0.02	0.02	0.03	0.07	0.05
Disabled	0.22	0.35	0.39	0.35	0.10
Months enrolled in plan	11.40	11.16	11.19	0.09	0.01
HCC score	1.20	1.65	1.78	0.45	0.10
HCC condition (flag = 1 if present)					
HIV/AIDS	0.00	0.01	0.01	0.04	0.00
Metastatic cancer and acute leukemia	0.01	0.02	0.02	0.03	0.01
Lung and other severe cancers	0.01	0.02	0.02	0.07	0.02
Lymphatic and other major cancers	0.01	0.01	0.01	0.01	0.00
Colorectal, bladder, and other cancers	0.02	0.02	0.02	0.04	0.02
Breast, prostate, and other cancers and tumors	0.06	0.05	0.06	0.00	0.01
Diabetes with acute complications	0.00	0.01	0.01	0.05	0.02
Diabetes with chronic complications	0.24	0.31	0.36	0.24	0.10
Diabetes without complications	0.06	0.07	0.08	0.07	0.05
End-stage liver disease	0.01	0.01	0.01	0.03	0.01
Cirrhosis of liver	0.01	0.01	0.01	0.05	0.02
Chronic hepatitis	0.01	0.02	0.02	0.05	0.01

Characteristic	UWgt Comp Mean	Wgt Comp Mean	UWgt VBID Mean	UWgt ASMD	Wgt ASMD
Rheumatoid arthritis and inflammatory connective tissue disease	0.08	0.11	0.12	0.11	0.01
Schizophrenia	0.01	0.02	0.02	0.08	0.00
Major depressive, bipolar, and paranoid disorders	0.17	0.23	0.24	0.15	0.02
CHF	0.04	0.08	0.08	0.16	0.02
Acute myocardial infarction	0.02	0.03	0.03	0.09	0.04
Unstable angina and other acute ischemic heart disease	0.01	0.02	0.02	0.07	0.02
Angina pectoris	0.05	0.07	0.10	0.16	0.07
Specified heart arrhythmias	0.14	0.17	0.20	0.16	0.09
Cerebral hemorrhage	0.00	0.01	0.01	0.02	0.01
Ischemic or unspecified stroke	0.02	0.03	0.04	0.09	0.04
Vascular disease with complications	0.02	0.03	0.03	0.08	0.03
Vascular disease	0.28	0.35	0.38	0.21	0.06
COPD	0.17	0.45	0.50	0.66	0.10
Acute renal failure	0.04	0.07	0.09	0.15	0.04
Chronic kidney disease, stage 5	0.00	0.00	0.00	0.02	0.00
Chronic kidney disease, severe (stage 4)	0.01	0.01	0.02	0.04	0.02
RxHCC dementia	0.04	0.05	0.05	0.05	0.00
RxHCC high cholesterol	0.68	0.74	0.75	0.17	0.04
RxHCC high blood pressure	0.58	0.58	0.55	0.05	0.06
Fall risk	0.04	0.05	0.05	0.07	0.03
Percent eligible for medication therapy management (MTM)	0.07	0.13	0.17	0.25	0.10
≥ $700 in total monthly Part D spending for 3 consecutive months	0.05	0.09	0.11	0.19	0.07
Chronic conditions identified with drug fills	0.20	0.23	0.28	0.17	0.10

Characteristic	UWgt Comp Mean	Wgt Comp Mean	UWgt VBID Mean	UWgt ASMD	Wgt ASMD
Nonadherent for specific drug classes in previous year	0.00	0.01	0.01	0.07	0.03
Two emergency department (ED) visits per month in two consecutive months	0.60	0.76	0.80	0.49	0.10
> 8 concurrent medications	0.07	0.13	0.17	0.25	0.10

SOURCE: RAND analysis of VBID-participating plan and other data. The complete list of data sources and variables is in Appendix D.
NOTE: HCC = hierarchical condition category; HIV/AIDS = human immunodeficiency virus/acquired immunodeficiency syndrome; MSB = mandatory supplemental benefit; MTM = medication therapy management; PDP = Part D plan; RxHCC = prescription drug HCC.

The aforementioned examples show how the EB worked, but they are not exhaustive because we estimated nearly 500 models encompassing all reported outcomes and participation patterns. Not all analyses included the same balancing characteristics. Some characteristics were not balanced because they were deemed to be too related to the outcome—for example, prior research shows that balancing on pre-period outcome data can bias results because of regression to the mean (Daw and Hatfield, 2018). In other cases, we omitted characteristics to enable better balance on other characteristics that we assessed to be of higher priority for inclusion. To summarize these choices, Tables C.4, C.5, and C.6 show the frequency with which variables were included in balancing for plan-, contract-, and beneficiary-level analyses, respectively.

Table C.4. Variable Frequency of Inclusion in Balancing, Plan-Level Analyses (429 total regressions)

Frequency of Use	Number of Variables	Variables
100%	6	Contract Star Rating, percent dually eligible for Medicaid, percent LIS, Part C in-network OOP maximum, MA penetration rate, standardized Medicare costs per capita
90–99%	30	Average age, percent disabled, for-profit status based on majority of beneficiary months enrollment, for-profit status based on majority of enrollment, percent with cancer, percent with CHF, percent with COPD, percent with diabetes, HPSA, moved into bonus payment, percent male, area-level income, moved out of bonus payment, percent urban, percent rural, percent suburban, percent over 65, PPO, average MA risk score, average Part D risk score, Puerto Rico county, C-SNP, D-SNP, I-SNP, percent AI/AN, percent API, percent Black, percent Hispanic, percent multirace, percent White
70–80%	3	Part D basic premiums, Part D supplemental premiums, Part D total premiums

Frequency of Use	Number of Variables	Variables
60–70%	25	Percent in MA region 1, Percent in MA region 2, Percent in MA region 3, Percent in MA region 4, Percent in MA region 5, Percent in MA region 6, Percent in MA region 7, Percent in MA region 8, Percent in MA region 9, Percent in MA region 10, Percent in MA region 11, Percent in MA region 12, Percent in MA region 13, Percent in MA region 14, Percent in MA region 15, Percent in MA region 16, Percent in MA region 17, Percent in MA region 18, Percent in MA region 19, Percent in MA region 20, Percent in MA region 21, Percent in MA region 22, Percent in MA region 23, Percent in MA region 24, Percent in MA region 27
50–60%	2	Part D bid, administrative costs
40–50%	5	MA bid, MA costs to CMS, Part D costs to CMS, MA premiums, Cost of MSB
30–40%	1	Rebate dollars amount

Table C.5. Variable Frequency of Inclusion in Balancing, Contract-Level Analyses (33 total regressions)

Frequency of Use	Number of Variables	Variables
100%	1	MA premiums
90–99%	43	Average age, MA bid, MA costs to CMS, Part D bid, Part D costs to CMS, percent disabled, percent dually eligible for Medicaid, for-profit status, percent with cancer, percent with CHF, percent with COPD, percent with diabetes, HPSA, percent LIS, percent male, area-level income, Part D total premiums, Part C in-network OOP maximum, percent non-Hispanic Black, percent rural, percent that belonged to plans ineligible in the analysis (neither comparison or VBID participating plans), MAPD LIS enrollees in as % total Medicare enrollment, total (MAPD and PDP) LIS enrollees as % total Medicare enrollment, percent MAPD enrollment, percent population aged > 65 Black alone, percent over 65, MA penetration rate, total Medicare covered net PMPM, total net PMPM for MSBs, PPO, average MA risk score, average Part D risk score, C-SNP, D-SNP, I-SNP, state/regional/national, standardized Medicare costs per capita, percent AI/AN, percent API, percent Black, percent Hispanic, percent multirace, percent White
30–40%	38	Contract Star Rating, rebate dollars amount, administrative costs, percent in MA region 1, Percent in MA region 2, Percent in MA region 3, Percent in MA region 4, Percent in MA region 5, Percent in MA region 6, Percent in MA region 7, Percent in MA region 8, Percent in MA region 9, Percent in MA region 10, Percent in MA region 11, Percent in MA region 12, Percent in MA region 13, Percent in MA region 14, Percent in MA region 15, Percent in MA region 16, Percent in MA region 17, Percent in MA region 18, Percent in MA region 19, Percent in MA region 20, Percent in MA region 21, Percent in MA region 22, Percent in MA region 23, Percent in MA region 24, Percent in MA region 27, Part D basic premiums, Part D supplemental premiums, percent urban, percent suburban, percent disabled, percent did not work, age 16 to 64, cost of MSB, reduction of A/B cost sharing, Puerto Rico county
0–10%	2	Number of beneficiary-months in all plans, number of beneficiaries enrolled in all plans in the month of July for the respective year

NOTE: PMPM = per member per month.

Table C.6. Variable Frequency of Inclusion in Balancing, Beneficiary-Level Analyses (24 total regressions)

Frequency of Use	Number of Variables	Variables
100%	82	Age; Blue Cross and/or Blue Shield affiliate; MA bid; chronic conditions identified with drug fills; Star Rating; Part D bid; disabled; plan enrollment; PO enrollment; ESRD; fall risk; ≥ $700 in total monthly Part D spending for three consecutive months; for-profit status; unstable angina and other acute ischemic heart disease; acute renal failure; angina pectoris; specified heart arrhythmias; breast, prostate, and other cancers and tumors; CHF, chronic hepatitis; cirrhosis of liver; chronic kidney disease, severe (stage 4); chronic kidney disease, stage 5; colorectal, bladder, and other cancers; COPD; major depressive, bipolar, and paranoid disorders; diabetes with acute complications; diabetes with chronic complications; diabetes without complications; end-stage liver disease; HIV/AIDS; cerebral hemorrhage; lung and other severe cancers; lymphatic and other major cancers; metastatic cancer and acute leukemia; acute myocardial infarction; rheumatoid arthritis and inflammatory connective tissue disease; schizophrenia; ischemic or unspecified stroke; vascular disease; vascular disease with complications; HPSA; LIS level 4; MA rebate dollars amount; percent male; median income; months enrolled in plan; nonadherent for specific drug classes in previous year; eligible for MTM; MA premium; Part D basic premium; Part D supplemental premium; Part D total premium; Percent non-Hispanic Black; percent disabled, age 16 to 64; percent did not work, age 16 to 64; percent over 65; percent over 65, Black; > eight concurrent medications; MA penetration rate; cost of MSB; PPO; Puerto Rico; RxHCC dementia; RxHCC high blood pressure; RxHCC high cholesterol; social deprivation index: Social deprivation index (percentile); MAPD LIS enrollees in 2021 as percent of total Medicare enrollment; Total (MAPD and PDP) LIS enrollees in 2021 as percent of total Medicare enrollment; C-SNP; I-SNP; state/regional/national; standardized Medicare costs per capita; administrative costs; percent API; percent AI/AN; percent Black; percent Hispanic; percent multirace; percent White; urbanicity
90–99%	2	Two ED visits per month in two consecutive months, 2+ hospital admissions in the past year
70–80%	8	HCC score, dual, LIS levels 1–4, LIS level 1, LIS level 2, LIS level 3, Part C in-network OOP maximum, D-SNP
10–20%	3	Total number of months enrolled in 2017, total number of months enrolled in 2018, offers Part D

NOTE: ESRD = end-stage renal disease.

Difference-in-Differences

The construction of weighted comparison groups is a prelude to DD modeling and serves to justify the central assumption needed for DD. The DD methodology (see Figure F.1) does not require that the balancing characteristics are perfectly balanced or that they are sufficient to control for confounding, as long as a so-called parallel trends assumption holds. A DD model works by assuming that the post-participation trend in the outcome for the comparison plans is a proxy for the trend in the VBID-participating plans had they not participated in VBID (the

parallel trends assumption), and then compares the change in the pre-participation outcome with the post-participation outcome between participating and comparison plans. The parallel trends assumption is untestable, but as a proxy, we use the pre-participation outcome trends. Using the pre-participation outcome trends as a proxy for the parallel trends assumption is valid only if we assume that the similarity of the trends in the pre-participation period implies that the trends would be similar in the post-participation period absent VBID participation. The assessment of parallel trends is incorporated into the EB algorithm in that we balance the pre-participation period trends so that the trends in the weighted comparison group look like the trends in the VBID plans. The benefit of balancing is that it relaxes the strength of the parallel trends assumption, requiring it to hold conditional on the balancing characteristics.

We specified DD models to account for any time-invariant unobserved differences and any common shocks that occur during the post-intervention period. Specifically, let y_{pti} denote the outcome of individual i in plan p at time t, let $VBID_p$ indicate that plan p is a VBID-participating plan, and let DID_{pt} denote the DD indicator for plan p at time t (DID_{pt} = 1 for VBID-participating plans in the post-intervention period and 0 otherwise). For each participation pattern, we fit a weighted DD models of the form

$$y_{pti} = \alpha_p + \eta_t + \beta_t \cdot DID_{pt} + \delta_t X_{pti} + \varepsilon_{pti} \qquad \text{(Equation C.3)}$$

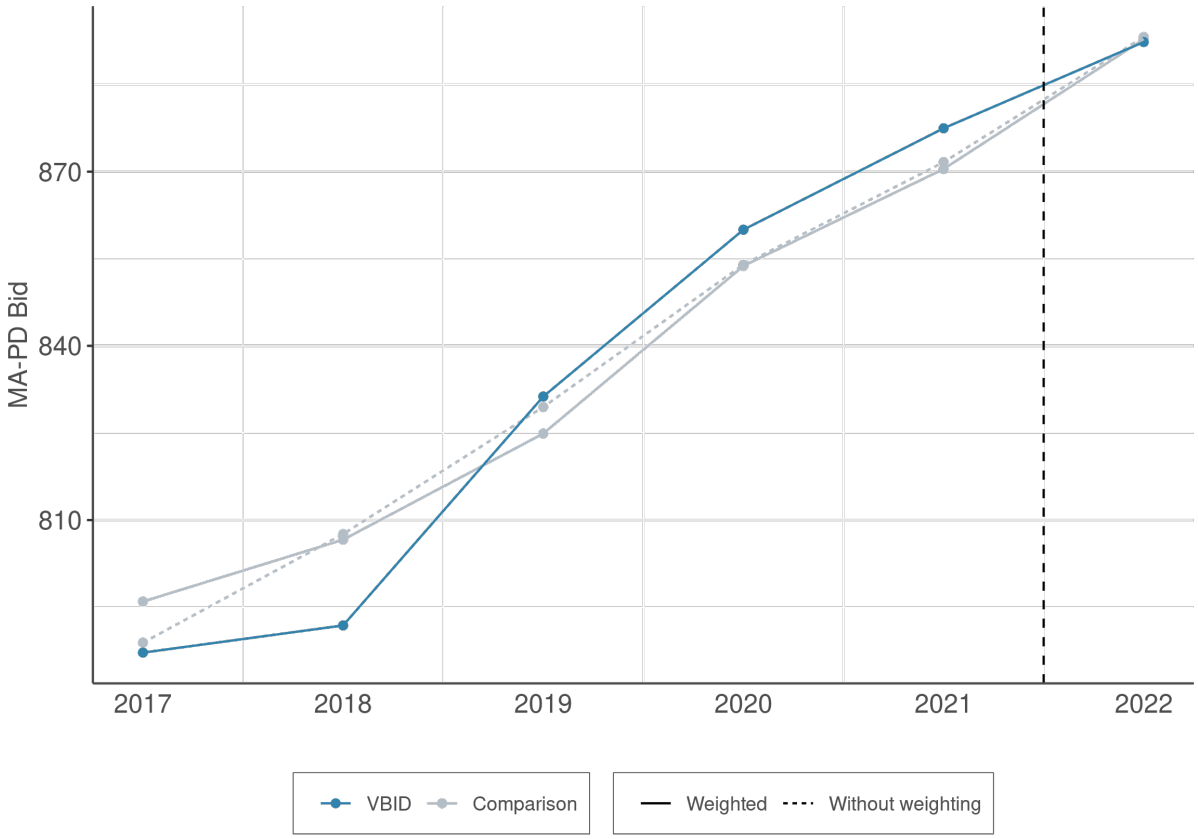
for each outcome year where plans in that participation pattern participated in VBID where α_p is a plan-specific intercept, η_t is a time fixed effect, β_t is the effect of interest at year t, and ε is an error term. Thus, years of VBID discontinuation (nonparticipation after participation) do not contribute to the aforementioned DD models. These DD models were fit for each of the groups of participating plans previously described such that the βt are estimates of $ATT(\boldsymbol{a}, t)$ for those groups of plans. Characteristics included in X_{pti} include participation in hospice, yearly COVID-19 (coronavirus disease 2019) case and death rates per 10,000 population in the plan's service area, and participation in other programs (such as the Part D Senior Savings Model), but most of the potential confounders are addressed through the application of the EB weights, which were described previously. The β_t for each group of participating plans were then summarized using the previously described methodology. Variance estimates were derived using a smooth version of the bootstrap such that plans were repeatedly reweighted using a beta distribution to approximate the sampling distribution.

Entropy-Balancing Impact on Parallel Trends

Figures C.5 through C.7 show the trends in the example plan-level analyses (MAPD bids) and beneficiary-level analysis (inpatient utilization) demonstrated in Tables C.1 through C.3. In all cases, pre-VBID trends are noticeably more parallel to varying degrees. The analysis in Figure C.5 is for plans that began participating in VBID in 2022, so 2017–2021 were all pre-VBID years. The biggest change in the weighted comparison group compared with the

unweighted one is in its 2017 mean outcome, in which the weighted comparison group's outcome is actually farther from the VBID 2017 mean outcome, but this obtains a better 2017–2018 trend (compare the weighted solid gray line with the unweighted dotted line). Similarly, the 2019 weighted outcome shifts downward (away from the VBID 2019 mean outcome) to obtain a more parallel 2019–2020 trend. The 2018–2019 trend remains noticeably different in the VBID and comparison groups before and after weighting.

Figure C.5. Exemplar Comparison of MAPD Bid Trends Before and After Entropy-Balancing Among Plans that Began Participating in VBID General in 2022



SOURCE: RAND analysis of VBID-participating plan and other data.
NOTE: Years to the right of the dashed vertical line are after VBID implementation. Years to the left of the dashed vertical line are pre-intervention years; changes in pre-intervention outcomes were used in the weighting algorithm. The parallel trends assumption is an inherently untestable assumption that the group trends in the post-participation period would be parallel absent VBID participation. This figure provides an assessment of the similarity of trends in the pre-participation period, which only implies similarity of the trends in the post-participation period if we assume that the similarity persists between the pre- and post-participation periods.

Results for the smaller participation pattern of plans that began participating in VBID in 2020, discontinued participation in 2021, and began again in 2022 are shown in Figure C.6. As

opposed to the unweighted trends in 2017–2019, which are continually rising, the weighted trends are relatively flatter and more similar to the slightly declining or flat VBID trends. This is a case in which the balancing algorithm delivered better but not perfect balance on the pre-VBID trends.

Figure C.6. Exemplar Comparison of MAPD Bid Trends Before and After Entropy-Balancing Among Plans That Began Participating in VBID General in 2020, Discontinued Participation in 2021, and Rejoined in 2022

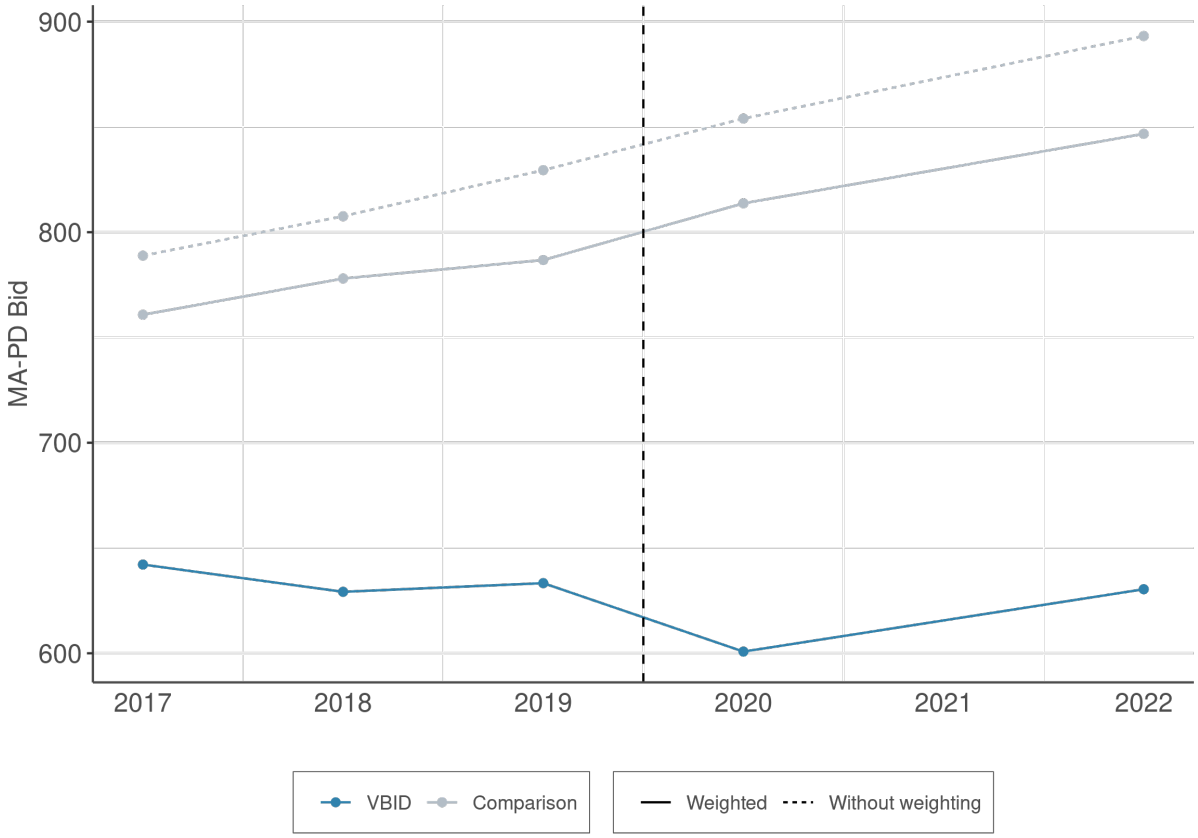
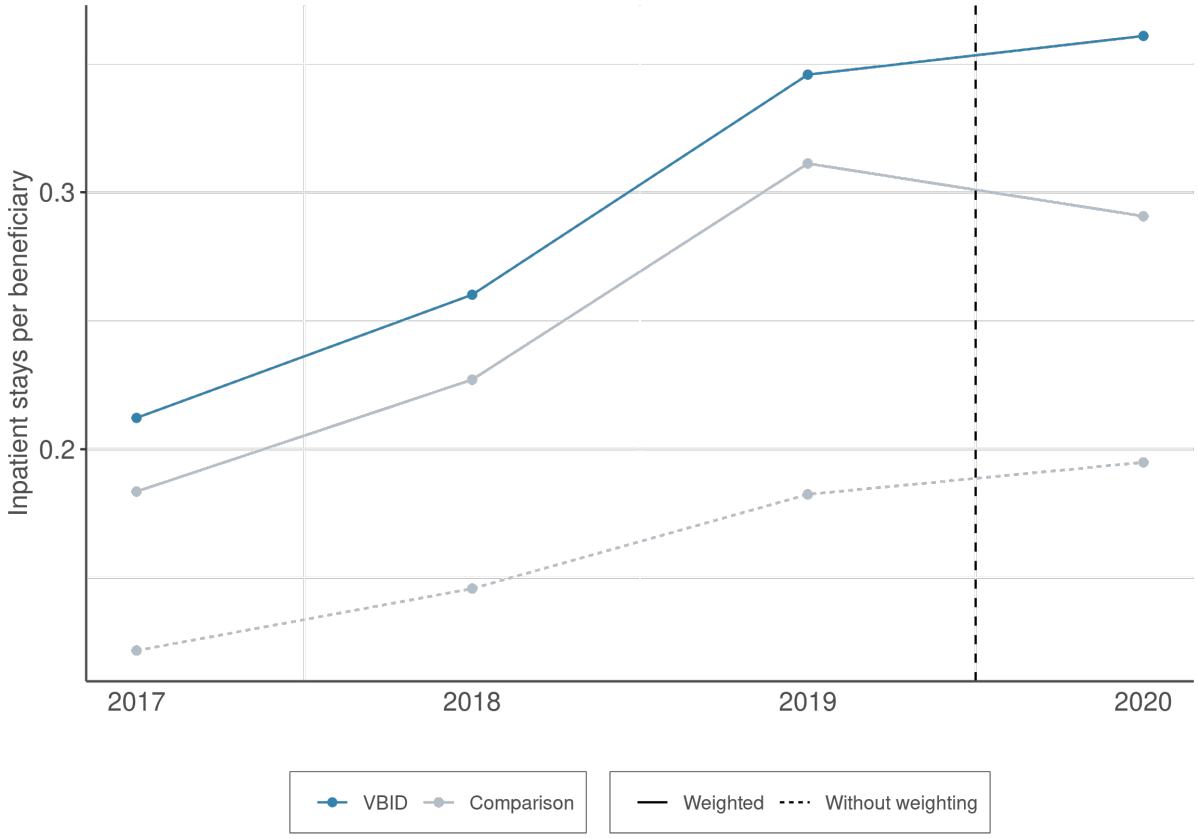


Figure C.7 shows an example of near-perfect balance on pre-VBID trends. Note also in Figure C.7 that, in addition to making the trends almost exactly parallel in the pre-VBID years, EB also brought the levels of the pre-VBID outcomes closer together. This reduction in the difference in levels between the two groups is a byproduct of balancing other covariates; we do not directly balance the levels of the pre-VBID outcomes.

Figure C.7. Exemplar Comparison of Inpatient Utilization Trends Before and After Entropy-Balancing



SOURCE: RAND analysis of VBID-participating plan and other data.
NOTES: Years to the right of the dashed vertical line are after VBID implementation. Years to the left of the dashed vertical line are pre-intervention years; changes in pre-intervention outcomes were used in the weighting algorithm. The parallel trends assumption is an inherently untestable assumption that the group trends in the post-participation period would be parallel absent VBID participation. This figure provides an assessment of the similarity of trends in the pre-participation period, which only implies similarity of the trends in the post-participation period if we assume that the similarity persists between the pre- and post-participation periods.

Differences Between Beneficiary-Level and Plan-Level Analyses

The mechanics of all analyses were essentially the same for all VBID General analyses: First, we balanced on pre-intervention characteristics, then we fit DD models, and finally we aggregated effects across participation patterns. However, there were some differences between analyses at the plan or contract levels and those at the beneficiary level. First, beneficiary-level analyses had only one participation pattern because beneficiary-level outcomes were only available for 2020. Thus, the only included beneficiaries were those in plans that began participating in VBID in 2020. In future years, beneficiary-level analyses will also use the additional methods to deal with staggered adoption and multiple participation patterns. Second,

all eligible plans and contracts with complete missing data in the post-intervention period were included in plan- and contract-level analyses. In beneficiary-level analyses, beneficiaries were included if they were enrolled in the same plan in both January 2019 (the last pre-intervention year) and January 2020 (the first post-intervention year). We refer to this subset of beneficiaries as the *stable cohort*. This inclusion requirement was needed to ensure that any differences we estimated between 2020 and 2019 were more likely to do with VBID rather than because of changes in the composition of beneficiaries in VBID and/or comparison plans.

Table C.7 shows descriptive statistics for all VBID General–targeted beneficiaries, VBID General–targeted beneficiaries in the stable cohort, all comparison beneficiaries, and all comparison beneficiaries in the stable cohort. These analyses show that beneficiaries in the stable cohort tend to be older, less likely to be eligible for Medicaid (dual eligible) or LIS, and more likely to have chronic conditions than those who are not in the stable cohort.

Table C.7. Comparison of All Beneficiaries to Those in the Stable Cohort for VBID General, 2019

	All Targeted Beneficiaries (*N* = 316,143)	Stable Cohort of Targeted Beneficiaries (*N* = 179,913)	All Beneficiaries in Non–VBID General Plans (*N* = 22,822,896)	Stable Cohort of Beneficiaries in Non–VBID General Plans (*N* = 8,643,362)
Age (mean, SD)	68.9 (12.0)	71.5 (11.3)	72.0 (10.0)	72.8 (9.7)
Dual eligible (%)	50.0%	38.8%	19.7%	17.1%
LIS eligible (%)	55.7%	45.5%	23.5%	22.9%
Male (%)	41.2%	43.0%	43.5%	44.2%
AI/AN (%)	5.0%	0.2%	2.1%	0.2%
API (%)	7.5%	2.8%	6.3%	4.9%
Black (%)	27.0%	21.8%	14.2%	10.6%
Hispanic (%)	14.9%	9.1%	14.8%	12.2%
White (%)	64.6%	66.0%	70.3%	72.1%
Multirace (%)	4.8%	0.0%	2.0%	0.0%
MA premium (mean, SD)	3.2 (14.6)	5.1 (18.4)	10.7 (26.3)	13.0 (29.1)
Part D premium (mean, SD)	19.0 (19.0)	18.0 (22.4)	14.4 (19.4)	15.4 (20.1)
Inpatient stays (mean, SD)	0.2 (0.8)	0.3 (0.9)	0.1 (0.6)	0.2 (0.6)
ED visits (mean, SD)	1.0 (2.5)	1.0 (2.3)	0.5 (1.5)	0.5 (1.4)
HCC risk score (mean, SD)	1.7 (1.3)	1.8 (1.4)	1.2 (1.1)	1.2 (1.1)
Diabetes HCC (%)	41.1%	44.5%	29.9%	30.5%
Cancer HCC (%)	11.1%	12.9%	10.6%	10.7%
CHF HCC (%)	7.8%	8.2%	3.5%	3.7%
COPD HCC (%)	44.2%	49.7%	15.7%	16.6%
≥2 Inpatient Visits in 2019 (%)	6.8%	7.5%	3.4%	3.5%
2+ ED visits per month in 2 consecutive months in 2019 (%)	1.3%	1.2%	0.4%	0.4%

SOURCE: RAND analysis of VBID-participating plan and other data. The complete list of data sources and variables is in Appendix D.

Changes in Methods from 2022 Evaluation Report

Some of the outcomes analyzed in this report were previously examined in RAND's 2022 Evaluation Report (Khodyakov et al., 2022), and estimates in this report sometimes differ from those previously reported.

In Chapter 7 of the main report, for example, we note that we had previously reported that VBID General implementation was associated with a reduction in the MAPD bid for 2021, whereas in the present report, we do not find statistically significant evidence that VBID General implementation was associated with the MAPD bid. We do not believe this difference is substantively meaningful because the 95% confidence intervals for the 2021 change in MAPD

bids associated with VBID General implementation are very similar between the previous report (95% CI: –$9.30 to –$1.44) and this report (–$8.25, $2.19).

Similarly, in Chapter 3, we note that we had previously reported that VBID General implementation was associated with a marginally statistically significant increase in plan enrollment, whereas in this report, we do not find statistically significant evidence that VBID General implementation was associated with plan enrollment. We also do not believe this difference is substantively meaningful because the 95% confidence intervals for the change in enrollment associated with VBID General implementation are very similar between the previous report (95% CI –0.2% to 12.9%) and this report (95% CI –2.4% to 17.7%).

While we do not view the difference in results between the 2022 report and this report as substantively meaningful, we do think it is worthwhile to catalog the methodological differences between the previous report and this report that could give rise to such differences in estimates. First, plan crosswalking in this report mapped 2017–2021 data to 2022 plan IDs, which could give rise to differences in results for 2020 and 2021 plans that were crosswalked to different plans in 2022 (refer to Appendix H for further details on crosswalking).

Second, the approach to calculating standard errors and confidence intervals used in this report was slightly more conservative than the approach used in the 2022 report. In the previous report, the balancing algorithm was re-run for every bootstrap sample, thus ensuring that balance on all characteristics was achieved for every bootstrap sample. This approach was not feasible for many of the analyses in this report because of the computational cost of running the balancing algorithm on datasets with millions of rows (as in the beneficiary-level analyses) or the difficulty in obtaining convergence in the balancing algorithm across all bootstrap datasets for very small participation patterns in plan-level analyses. Thus, we instead fixed the balancing weights and obtained bootstrap standard errors that were conditional on these balancing weights. Because some bootstrap samples have worse covariate balance than the original sample, our bootstrap standard errors include some additional variability and are thus more conservative.

Third, the comparison group of nonparticipating plans changed between 2021 and 2022 because some plans entering the model test for the first time in 2022 may have been included in the comparison group in the earlier report but were excluded from all comparison groups in this report. Fourth, the set of control variables expanded in this report to include two sets of additional geographic controls: MA enrollment by region (included in EB) and yearly COVID-19 case rates and death rates for counties in each plan's service area (included as time-varying variables). Fifth, our EB approach in this report balanced only first moments in contrast to balancing both first and second moments in the earlier report. Sixth, the approach to selecting the tolerance for EB was changed in this report to allow automated selection of the tolerance. Changes to the methods for EB were necessitated by some difficulties in achieving balance for some of the smaller and more-complex participation patterns that emerged with an additional year of the model test.

As the model ages and more data become available, the methods needed to evaluate VBID will also need to evolve in similar ways as they have for this report. Some necessary changes may become apparent only as new data become available, but some changes are predictable at the time of this writing. For example, as more years of beneficiary-level data become available, a stable cohort of targeted beneficiaries enrolled in the VBID plan both before and in all years after VBID implementation is unlikely to be workable inferentially or generalizable to the population of all targeted VBID beneficiaries. Methods that account both for differences between VBID and comparison plans as well as for differences in patient case-mix over time will be required. Furthermore, we exclude plans that participated in VBID in any year from the comparison group. However, the set of plans and contracts that never participated will continue to shrink as more plans implement VBID, thus changing the comparison group for plan- and contract-level analyses. We will continue to evaluate whether this comparison group should be used or if we should consider augmenting this never-participating group. For example, we could allow plans that participated in some years but not others to be comparators for years in which they were nonparticipants.

Limitations

Our approach has several important limitations that should be considered when interpreting the findings. First, participation in the VBID Model test is voluntary, and participants were observably different from eligible nonparticipants. Although we control for a large number of relevant plan-, PO-, and community-level characteristics in our EB algorithm, and the methods described previously aim to enable causal inference in a nonrandomized research setting, the possibility remains that we could ascribe effects driven by underlying differences between participating and nonparticipating plans to the model test. This concern is heightened by the fact that the parallel trends assumption, which is critical to the validity of DD methods, is inherently untestable. For this reason, we use associational rather than causal language when discussing our findings, although our models estimate causal effects when assumptions hold.

Second, our analysis treats Phase II of the model test as separate and distinct from Phase I and does not give plans "credit" for effects stemming from Phase I participation. For example, if a plan participated in Phase I and experienced reductions in bids as a result, our analysis would capture this effect only if the trend in bids diverged from the Phase I pattern after Phase II was implemented. Conceptually, this approach measures the effects of participation in Phase II of the model test. However, it could underestimate the effects of participation in VBID if VBID is defined to include interventions allowed in either Phase I or Phase II. We expect that any underestimate would be small, however, because only four POs continued participation from Phase I, and one of those POs substantially revised its intervention in Phase II.

Third, beneficiary-level participation varied substantially across plans, both because some plans targeted a broader range of beneficiaries and because some plans had higher uptake conditional on beneficiaries' eligibility status. Our analysis uses an intent-to-treat (ITT) approach

in which we treat all plans equally, regardless of the scope of their interventions or beneficiary-level uptake. Similarly, for beneficiary-level analyses, we consider all beneficiaries who are targeted for their plans' VBID intervention to be part of the treatment group, regardless of whether they used VBID benefits or completed participation requirements. The ITT approach is useful from CMS' perspective because it sheds light on how implementing a model of this type is likely to affect outcomes in practice, given uneven implementation, differential beneficiary engagement, and other differences across participants. However, it may not generalize to specific plans that have designed interventions with broader or narrower eligibility criteria or that have instituted policies to maximize uptake. Furthermore, while the ITT approach estimates effects for all VBID targeted beneficiaries, it cannot be used to assess the effects of the model on beneficiaries who engaged with the intervention (e.g., by using benefits or meeting participation requirements).

Finally, beneficiary-level analyses that limited to a stable cohort of beneficiaries who were in the same plan in 2019 and 2020 may have limited generalizability to the population of all patients in VBID-participating plans.

Hospice Analyses

We used a similar set of analytic tools to analyze the quantitative Hospice outcomes, chiefly DD and EB. For plan-level financial outcomes (analyzed in Chapter 11 in the main text), methods are identical to those described previously for analysis of changes in plan-level financial outcomes associated with VBID General interventions.

However, because many beneficiary-level outcomes of interest for Hospice can be observed only once for an individual at or near the end of their life, we are not able to estimate the effects of interest using data that track individuals over multiple years. Unlike the VBID General analyses in which we analyze a stable panel of beneficiaries over time, there is a concern that the composition of the treatment or comparison group might shift over time in a way that degrades the parallel trends assumption underlying DD analyses.

Because we are unable to accurately model beneficiary death in a prospective fashion (as is relevant for the denominator of many outcomes that are typically experienced near end-of-life), several of our key hospice outcomes use the cohort of decedents in a given year. For example, we are not able to identify beneficiaries prospectively who are eligible for hospice admission in a given year, so we instead analyze hospice admission rates in the decedent cohort; for example, the cohort of beneficiaries who passed away in a given year. Other outcomes relate to the cohort of beneficiaries admitted to Hospice, such as Consumer Assessment of Healthcare Providers and Systems (CAHPS) Hospice measures. Beneficiaries in these analyses may or may not have been included in the decedent cohort in a given year.

If the treatment were applied in a randomized manner, we would expect the distributions of covariates to be approximately balanced between each of the four groups defined by time period

and treatment group: pre-period treated; pre-period control; post-period treated, and post-period control. Our analytic approach attempts to create such balance, as described by (Stuart et al., 2014). More specifically, we weighted each of the other three groups to match the covariate distribution of the post-period treated group.

In EB-weighted DD analyses, we do not wish to weight on variables that are measured after the intervention and may have been affected by the intervention itself. For the longitudinal VBID General analyses, this is easier to achieve where we can focus on variables that are measured before VBID started. For the Hospice analyses, we wish to balance on variables that are potentially associated with the outcomes of interest, but not include measures that may have been affected by the intervention itself. The variables included in the analyses attempt to walk this line, but inevitably, there will be cases in which the groups will differ compositionally in important ways, although the DD analysis should also help to resolve any lingering differences between the treated and control groups.

Because access to health care services was so strongly affected in the early phases of the COVID-19 pandemic, we do not include 2020 data in our analyses. Rather, we use 2019 as the pre-intervention period and 2021 as the post-intervention period; data from 2018 and earlier are available to assess parallel trends if any associations had been significant. Because we only have one year of post-participation period data, we do not have the multiple participation patterns that complicate the VBID General analyses as described previously.

Limitations

The Hospice analyses face two primary difficulties. First, a small fraction of beneficiaries is in Hospice-participating plans (and a small fraction of plans are Hospice-participating). Second, those who are in Hospice-participating plans have very different characteristics, on average, than those who are not in Hospice-participating plans. The strong difference in beneficiary characteristics between the intervention and control groups seems to be driven, in part, by the fact that a majority of beneficiaries in Hospice-participating plans in our analyses are in Puerto Rico. Many of the potential comparison beneficiaries are not a good match for our treated group either explicitly because of geography (for example, Puerto Rico versus the mainland United States) or because of other characteristics that are systematically different between the two groups.

In beneficiary-level analyses of the Hospice component, effective sample sizes after applying EB weights are much smaller than the nominal sample sizes, which strongly reduces statistical power. Even with these drastically reduced effective sample sizes, we were nonetheless unable to achieve our desired levels of balance; there were some SMDs as large as 0.3. See Appendix M for more details.

The differences between the Hospice participants and nonparticipants led to similar challenges with balancing in our analyses of plan-level financial outcomes for plans that implemented the Hospice component in 2021. Even after EB, SMDs for many plan

characteristics exceeded our targets: SMDs in some characteristics were as large as 0.84 in absolute value after balancing. For plans that adopted the Hospice component in 2022, observable differences from the nonparticipating plans were more modest, and balance was achieved on all characteristics for all plan-level outcome models presented in this report.

In the end, our Hospice analyses produce relatively wide confidence intervals for our treatment effect estimates because the strong imbalance between treated and control groups in the unweighted data results in many comparison observations being given negligible weight in the final analysis. Additionally, the relatively poor balance of some potential confounders—even after weights are applied—means that the confidence intervals would likely be wider still if we were able to achieve standard balance targets of no SMDs larger than 0.1 or 0.2. Data limitations constrain our ability to make strong claims about the treatment effects of VBID Hospice participation on our outcomes of interest, although the DD design should resolve some lingering imbalances.

Appendix D. Variables Used in Analysis

Table D.1, Variables Used in This Report's Analyses, begins on the following page.

Table D.1. Variables Used in This Report's Analyses

Aggregation Levels	Variable	Data Source	Years	Construction of Variable	Used for
County, contract, plan	Area-level income	American Community Survey (ACS) 2019 5-year estimates	2019	Defined as median income in the past 12 months (in 2019 inflation-adjusted dollars). Merged to plan benefit package (PBP)–county file and weighted by beneficiary-months.	VBID General EB
County, PO, contract, plan	MA penetration	CMS	2017–2022	Derived from July County-State Penetration file from CMS. Merged with PBP-county file and weighted using beneficiary months.	VBID General EB
County, PO, contract, plan	Urbanicity	Rural-Urban Continuum Codes (RUCC)	2013	Values assigned using following schema: metro/urban(Center for Medicare & Medicaid Innovation, CMS, 2020a), adjacent to metro/suburban (Guest, MacQueen and Namey, 2012), nonmetro/rural = (Guest, MacQueen and Namey, 2012). Calculate share of counties within PBP that are urban, suburban, and rural.	VBID General EB
County, contract, plan	HPSA	Area Health Resources Files (AHRF)	2017–2022	Defined using HPSA Primary Care code from AHRF file. Merged to PBP-county file, calculated the share of beneficiary-months in counties designated as a whole shortage area (rather than partial shortage area).	VBID General EB, descriptives
County, contract, plan	Standardized Medicare costs per capita	AHRF	2019	Merged to PBP-county file and weighted using beneficiary-months .	VBID General EB
County, contract, plan	% of population over 65	AHRF, Integrated Data Repository (IDR): dim_bene_enrlmt_snpsht_crnt & dim_geo tables	2020–2022	Percentage over 65 weighted by county or contract or plan level enrollment in the plan	VBID General EB
County, contract, plan	Puerto Rico county	ACS and AHRF	2017–2022	States FIPS code = "72" for determination	VBID General EB

Aggregation Levels	Variable	Data Source	Years	Construction of Variable	Used for
County, contract, plan	Social Deprivation Index	ACS and AHRF	2017–2022	See Butler et al., 2013.	VBID General EB
County, contract, plan	% population that did not work, 16–64	ACS and AHRF	2017–2022		VBID General EB
County, contract, plan	% population aged >65, Black alone	ACS and AHRF	2017–2022		VBID General EB
County, contract, plan	% disabled, 18–64, civil non-institutionalized	ACS and AHRF	2017–2022		VBID General EB
County, contract, plan	% population Black, non-Hispanic	Census county estimates	2017–2022		VBID General EB
County, contract, plan	Total (MAPD and PDP) LIS enrollees as % total Medicare enrollment	IDR	2017–2022		VBID General EB
County, contract, plan	MAPD LIS enrollees as % total Medicare enrollment	IDR	2017–2022		VBID General EB
County, Contract, Plan	Yearly COVID-19 case rate for adults aged 60+	Centers for Disease Control and Prevention (CDC) Restricted-Use COVID-19 Case Data; SEER Population X Age Denominators	2020–2022	Rate per 10,000 population of confirmed COVID-19 cases reported to CDC for county in year.	Control
PO	Blue Cross and/or Blue Shield affiliate	CMS	2017–2022	Text field search of PO and organization-level names (see table note)	Descriptives

Aggregation Levels	Variable	Data Source	Years	Construction of Variable	Used for
PO	For-profit status	Health Plan Management System (HPMS) contract information	2020–2022	Contract-level information on for-profit status. aggregated to the PO level, using the most common status across contracts.	Descriptives
PO	State/regional/ national	CMS	2017–2022	State = 0 (≤2 states), regional = 1 (3–8 states), national = 2 (9+ states)	Descriptives
PO	Median income	ACS 2019 5-year estimates; CMS	2019	Median income across counties in PO's service area, enrollment-weighted	Descriptives
PO	PO enrollment	CMS	2017–2022	Total enrollment across eligible plans	Descriptives
Contract	Star rating (overall)	CMS Star Rating	Reporting year 2017–2023	Using reporting years (2017 through 2023), final overall scores were obtained for each contract	VBID General and Hospice EB
Contract	For-profit status	HPMS contract information	2020–2022	Contract-level information on for profit status	VBID General and Hospice EB
Contract	Newly transitioned into bonus	CMS Star Rating	2020–2022	"BONUS" = OVERALL STAR > = 4.0. "into bonus" = plan rating increased and crossed bonus threshold.	VBID General and Hospice EB
Contract	Newly transitioned out of bonus	CMS Star Rating	2020–2022	"BONUS" = OVERALL STAR > = 4.0. "out of bonus" = plan rating decreased and crossed bonus threshold.	VBID General and Hospice EB
Contract, plan	Part C cost to CMS	Office of the Actuary (OACT)	2017–2022	Cost = standardized bid * MA risk score + rebate : all variables in OACT Bid Pricing Tool (BPT) data	VBID General entropy- and Hospice-balancing, outcome
Contract, plan	Part D cost to CMS	OACT, Part D Event data (PDE), CMS publicly available data (regional benchmarks/ average bid amounts)	2017–2022		VBID General entropy- and Hospice-balancing, outcome
Contract, plan	Bids—MA	OACT	2017–2022	Defined as standardized Part A/B bid (at 1.000)	EB, outcome

Aggregation Levels	Variable	Data Source	Years	Construction of Variable	Used for
Contract, plan	Bids—Part D (if applicable)	OACT	2017–2022	Defined as standardized Part D bid amount	EB, outcome
Contract, plan	MA premiums	CMS	2017–2022	Part C premium variable from HPMS	Descriptives, EB, outcome
Contract, plan	Part D premiums (if applicable)	CMS	2017–2022	Part D total premium variable from HMPS	Descriptives, EB, outcome
Contract, plan	Cost of MSB	OACT	2017–2022	Defined as total net PMPM for additional services	EB, outcome
Contract, plan	Rebate dollars amount	OACT	2017–2022	Defined as the total rebate dollars per enrollee per month from the OACT bid data file	EB, outcome
Contract, plan	Administrative costs (bid data)	OACT	2017–2022	Defined as the sum of MA nonbenefit expenses and total Part D nonbenefit expenses	EB, outcome
Contract, plan	Offers Part D	CMS PBP benefits data	2017–2022		Descriptives, EB
Contract, plan	OOP maximum (Part C)	CMS PBP benefits data	2017–2022		Descriptives, EB
Contract, plan	Part D Senior Savings (PDSS) participant	CMS PBP benefits data	2022		Descriptives, control
Contract, plan	Offers uniformity flexibility (UF)	CMS PBP benefits data	2019–2022		Descriptives, control
Contract, plan	Offers Special Supplemental Benefits for the Chronically Ill (SSBCI)	CMS PBP benefits data	2020–2022		Descriptives, control
Contract, plan	Offers New Primarily Healt-Related Supplemental	CMS PBP benefits data	2019–2022	Defined to indicate if a plan offers at least one PHRSB.	Descriptives, control

Aggregation Levels	Variable	Data Source	Years	Construction of Variable	Used for
	Benefits (PHRSB)				
Contract, plan	Type of plan	CMS	2017–2022	Plan type from publicly available CMS contract information file; PPO = 1; otherwise= 0	EB
Contract, plan	SNP	HPMS plan information files	2019–2022	Identified SNP plans using SNP flag in the source data	Descriptives, EB
Contract, plan	SNP type	HPMS plan information files	2019–2022	Identified SNP type using SNP flag in the source data	Descriptives, EB
Plan	Enrollment	IDR, bene_fct_trans table	2017–2022	Defined as number of beneficiaries enrolled in the plan as of July 1st for the respective year	VBID General EB, outcome
Plan	Age	IDR, bene_fct_trans table	2019–2022	Mean age of all beneficiaries enrolled in plan for the year, weighted by member months	EB
Plan	Sex	IDR, bene_fct_trans table	2019–2022	Percentage male for the respective year for each plan (use member months to calculate)	Descriptives, EB
Plan	Race/ethnicity	Medicare Bayesian Improved Surname Geocoding dataset	2019–2022	Take the mean probabilities of each beneficiaries being a given race and roll up to the plan level	Descriptives, EB
Plan	Dual	IDR, mdcr_bene_dual_stus table, mdcr_bene_low_incm_terr, mdcr_bene_pos	2019–2022	If beneficiary is flagged as dual in any of the three tables during the respective year, they are considered dual and then rolled up to plan level (for example, only require at least one month of dual status), calculated with member months	Descriptives, EB
Plan	LIS status	IDR, bene_fct_trans table	2019–2022	Beneficiaries with full or partial status for LIS are considered to have LIS. Beneficiaries considered are those who are enrolled in the plan during July of the respective year. At least one month of LIS is considered LIS. Calculated by member months. If beneficiaries have a change in LIS status through the year, we take the most common status, and in the event of a tie, we take the	Descriptives

Aggregation Levels	Variable	Data Source	Years	Construction of Variable	Used for
				lower number because it indicates a higher subsidy.	
Plan	Average MA risk score (HCC)	IDR, mdcr_bene_risk_ptc_scre_asg	2019–2022	Mean final beneficiary risk scores (2019–2020) and mean midyear beneficiary risk scores (2021–2022) and roll up to plan level, weighted by member months	Descriptives, EB
Plan	Average Part D risk score (RxHCC)	IDR, mdcr_bene_risk_ptc_scre_asg	2019–2022	Mean final beneficiary Rx risk score and roll up to plan level, weighted by member months	EB
Plan	% diabetes	IDR: mdcr_bene_risk_ptc_l_scre	2019–2022	HCC flags—% beneficiaries with this flag calculated with member months	EB
Plan	% CHF	IDR: mdcr_bene_risk_ptc_l_scre	2019–2022	HCC flags—% beneficiaries with this flag calculated with member months	EB
Plan	% COPD	IDR: mdcr_bene_risk_ptc_l_scre	2019–2022	HCC flags—% beneficiaries with this flag calculated with member months	EB
Plan	% cancer	IDR: mdcr_bene_risk_ptc_l_scre	2019–2022	HCC flags—% beneficiaries with this flag calculated with member months	EB
Plan	Yearly COVID-19 case rate for adults aged 60+	CDC Restricted-Use COVID Case Data; SEER Population X Age Denominators	2019–2022	Enrollment-weighted average of county-level COVID-19 case rates for each year.	Control
Plan	% of PBP beneficiaries in MA region	IDR, bene_fct_trans table, CMS MA region dataset	2019–2022	One variable for each region. The value is the % of each MA region's share of beneficiary months for each PBP/contract within the year.	EB
Beneficiary	Age	IDR, bene_fct_trans table	2019	Age as of 12/31 of the year	EB
Beneficiary	Sex	IDR, bene_fct_trans table	2019	Sex	EB

Aggregation Levels	Variable	Data Source	Years	Construction of Variable	Used for
Beneficiary	Race or ethnicity	Medicare Bayesian Improved Surname Geocoding dataset	2019	Beneficiary assigned probability of being each race or ethnicity category (Native American; API, Black, Hispanic, multiple, white)	EB
Beneficiary	Dual	IDR, mdcr_bene_dual_stus table, mdcr_bene_low_incm_terr, mdcr_bene_pos	2019	Beneficiary flagged as dual in any of the three tables during the respective year, they are considered dual (50% or more of months bene must have dual status)	EB
Beneficiary	LIS status, 1–4	IDR, bene_fct_trans table	2019	Four flags, one for each level because some plans only targeted beneficiaries with some of the LIS levels (50% or more of months beneficiary must have LIS status). If beneficiary changes LIS status through the year, we take the most common status. If there is a tie, we take the lowest number because it implies greater cost-sharing protection (and lower incomes)	EB
Beneficiary	Disabled	IDR, bene_fct_trans table	2019	Reason for entitlement code of disabled (original entitlement reason code)	EB
Beneficiary	ESRD	IDR, bene_fct_trans table	2019	Reason for entitlement code of ESRD—these beneficiaries are excluded (original entitlement reason code)	EB
Beneficiary	Months enrolled in PBP	IDR, bene_fct_trans table	2019	Number of months enrolled in 2020 in the same plan as of January 1, 2020 (for stable cohort definition)	EB
Beneficiary	HCC score	IDR: mdcr_bene_risk_ptc_l_scre	2019	Final beneficiary risk score for the year	EB
Beneficiary	HCC condition flags	IDR; Part C, Part D, inpatient, outpatient claims	2019	Beneficiary has flag =1 if they have one of the specific condition flags. Limiting to the ones where at least one PO uses the condition in eligibility criterion. See Table C.2 for full list.	EB

Aggregation Levels	Variable	Data Source	Years	Construction of Variable	Used for
Beneficiary	Eligible for MTM	IDR; Part D files have an MTM-eligible and MTM-received flag	2019	Equals 1 if beneficiary is eligible for MTM, according to PDE flag	EB
Beneficiary	> = $700 in total monthly Part D spend for 3 consecutive months	IDR; encounter data	2019	Equal 1 if beneficiary has > = $700 in Part D spend for any three consecutive months in the year	EB
Beneficiary	Two or more hospital admissions in past year	IDR; encounter data	2019	Equals 1 if beneficiary has at least two hospitalizations in past year	EB
Beneficiary	Chronic conditions identified with drug fills	IDR; PDE	2019	Equals 1 if beneficiary is in the denominator for specific Star component measures: D08—diabetes; D09—hypertension; D10—high cholesterol (denominator requires at least two fills).	EB
Beneficiary	Nonadherent for specific drug classes in previous year	IDR; PDE	2019	Equals 1 if beneficiary has a zero for the numerator for specific Star component measures: D08—diabetes; D09—hypertension; D10—cholesterol (denominator requires at least two fills).	EB
Beneficiary	Two ED visits per month in two consecutive months	IDR; encounter data	2019	Equals 1 if beneficiary has at least four ED visits in a consecutive two-month period in calendar year. No overlap between calendar years.	EB
Beneficiary	> eight concurrent medications	IDR; encounter data	2019	Equals 1 if beneficiary had more than eight unique medications annually.	EB
Beneficiary	Beneficiary's MA region using their state of residence	IDR	2019	Using State of Federal Information Processing Standards (FIPS) to then map to MA region	EB
Beneficiary	Hospice enrollment in	IDR; FFS hospice claims	2019, 2021	Indicator for if decedent was enrolled in hospice in the year they died. Decedents in VBID and comparison plans were identified	Outcome (Hospice)

Aggregation Levels	Variable	Data Source	Years	Construction of Variable	Used for
	the year of death			using the IDR. Hospice enrollment was identified using FFS hospice claims.	
Beneficiary	Length of final episode of hospice care (days)	FFS hospice claims; IDR	2019, 2021	Number of days in hospice decedent's final episode of hospice care. Decedents in VBID and comparison plans were identified using the IDR. Hospice enrollment and length of final episode of care were identified using FFS hospice claims.	Outcome (Hospice)
Beneficiary	Final LOS less than three days	FFS hospice claims; IDR	2019, 2021	Indicator for if hospice decedent's length of final episode of hospice care (see above) was less than three days.	Outcome (Hospice)
Beneficiary	Final LOS less than seven days	FFS hospice claims; IDR	2019, 2021	Indicator for if hospice decedent's length of final episode of hospice care (see above) was less than seven days.	Outcome (Hospice)
Beneficiary	Final LOS more than 180 days	FFS hospice claims; IDR	2019, 2021	Indicator for if hospice decedent's length of final episode of hospice care (see above) was more than 180 days	Outcome (Hospice)
Beneficiary	Professional visits in at least two of last three days of life	FFS hospice claims; IDR	2019, 2021	Indicator for if hospice decedent received professional visits in at least two of their last three days of life. Decedents in VBID and comparison plans were identified using the IDR. Hospice enrollment and professional visit usage and dates were identified using FFS hospice claims.	Outcome (Hospice)
Beneficiary	Summary CAHPS Hospice Survey score	CAHPS Hospice Survey responses; FFS hospice claims; IDR	2019, 2021	The summary CAHPS Hospice survey measure scores were calculated for each beneficiary by averaging each beneficiary's score across CAHPS measures. In this calculation, the six composite measures assessing specific aspects of care experience received equal weight, whereas the two global assessment measures, overall rating, and willingness to recommend each received half weight because both are overall assessments of care delivered by the hospice (Anhang Price et al., 2020). For beneficiaries that were missing scores for a given measure, mean scores within the year	Outcome (Hospice)

Aggregation Levels	Variable	Data Source	Years	Construction of Variable	Used for
				were imputed for the measure. Scores were adjusted for mode of survey administration. Enrollees in VBID and comparison plans were identified using the IDR. CAHPS Hospice summary scores were calculated from CAHPS Hospice Survey response data. Because CAHPS Hospice Survey data do not contain beneficiary names or identification numbers, we linked CAHPS Hospice Survey responses to hospice claims data by matching based on available variables (hospice CMS Certification Number [CCN]; beneficiary date of death, date of birth, hospice admission date, primary diagnosis, and sex).	
Beneficiary	Any live discharges from hospice in the given year	FFS hospice claims; IDR	2019, 2021	Indicator for if hospice enrollee had a live discharge (including all reasons for live discharge) from hospice in the given year. Enrollees in VBID and comparison plans were identified using the IDR. Hospice enrollment and live discharges were identified using FFS hospice claims.	Outcome (Hospice)
Beneficiary	Transfer from hospice in the given year	FFS hospice claims; IDR	2019, 2021	Indicator for if hospice enrollee had a transfer from hospice in the given year. Enrollees in VBID and comparison plans were identified using the IDR. Hospice enrollment and transfers were identified using FFS hospice claims.	Outcome (Hospice)
Beneficiary	Revocation in the given year	FFS hospice claims; IDR	2019, 2021	Indicator for if hospice enrollee had a live discharge from hospice in the given year. Enrollees in VBID and comparison plans were identified using the IDR. Hospice enrollment and revocation were identified using FFS hospice claims.	Outcome (Hospice)
Beneficiary	Death within 30 days of a live discharge but before the end	FFS hospice claims; IDR	2019, 2021	Indicator for if the hospice enrollee that had a live discharge died within 30 days (but before the end of the calendar year) of the live discharge. Enrollees in VBID and	Outcome (Hospice)

Aggregation Levels	Variable	Data Source	Years	Construction of Variable	Used for
	of the calendar year			comparison plans were identified using the IDR. Hospice enrollment, live discharges, and death date were identified using FFS hospice claims.	
Beneficiary	Transfer to another hospice within seven days of a live discharge but before the end of the calendar year	FFS hospice claims; IDR	2019, 2021	Indicator for if the hospice enrollee that had a live discharge transferred to another hospice within seven days (but before the end of the calendar year) of the live discharge. Enrollees in VBID and comparison plans were identified using the IDR. Hospice enrollment, live discharges, and transfers were identified using FFS hospice claims.	Outcome (Hospice)
Beneficiary	Decedent age	CAHPS Hospice administrative data files provided by vendors; FFS hospice claims	2019, 2021	Decedent age was obtained from CAHPS Hospice administrative data files. CAHPS Hospice Survey responses were matched with FFS hospice claims data using available beneficiary-level variables.[a]	Hospice balancing (summary CAHPS Hospice Survey score only)
Beneficiary	Decedent payer for hospice care (including payers in addition to Medicare)	CAHPS Hospice administrative data files provided by vendors; FFS hospice claims	2019, 2021	Decedent payer for hospice care was obtained from CAHPS Hospice administrative data files. CAHPS Hospice Survey responses were matched with FFS hospice claims data using available beneficiary-level variables.[a]	Hospice balancing (summary CAHPS Hospice Survey score only)
Beneficiary	Decedent primary diagnosis	CAHPS Hospice administrative data files provided by vendors; FFS hospice claims	2019, 2021	International Classification of Diseases (ICD)-9 and ICD-10 codes, obtained from CAHPS Hospice administrative data files, are used to categorize primary diagnosis. CAHPS Hospice Survey responses were matched with FFS hospice claims data using available beneficiary-level variables.[a]	Hospice balancing (summary CAHPS Hospice Survey score only)
Beneficiary	Decedent length of final episode of hospice care	CAHPS Hospice administrative data files provided by vendors; FFS hospice claims	2019, 2021	Decedent length of final episode of hospice care. CAHPS Hospice Survey responses were matched with FFS hospice claims data using available beneficiary-level variables.[a]	Hospice balancing (summary CAHPS Hospice Survey score only)

Aggregation Levels	Variable	Data Source	Years	Construction of Variable	Used for
Beneficiary	Respondent age	CAHPS Hospice survey responses; FFS hospice claims	2019, 2021	Respondent age. CAHPS Hospice Survey responses were matched with FFS hospice claims data using available beneficiary-level variables.[a]	Hospice balancing (summary CAHPS Hospice Survey score only)
Beneficiary	Respondent education	CAHPS Hospice survey responses; FFS hospice claims	2019, 2021	Respondent education. CAHPS Hospice Survey responses were matched with FFS hospice claims data using available beneficiary-level variables.[a]	Hospice balancing (summary CAHPS Hospice Survey score only)
Beneficiary	Respondent relationship to caregiver	CAHPS Hospice survey responses; FFS hospice claims	2019, 2021	Respondent relationship to caregiver. CAHPS Hospice Survey responses were matched with FFS hospice claims data using available beneficiary-level variables.[a]	Hospice balancing (summary CAHPS Hospice Survey score only)
Beneficiary	Survey Language/ respondent's home language	CAHPS Hospice survey responses; CAHPS Hospice administrative data files provided by vendors; FFS hospice claims	2019, 2021	Survey language was obtained from CAHPS Hospice administrative data files provided by vendors. Respondent's home language was obtained from CAHPS Hospice survey responses. CAHPS Hospice Survey responses were matched with FFS hospice claims data using available beneficiary-level variables.[a]	Hospice balancing (summary CAHPS Hospice Survey score only)
Beneficiary	Response percentile	CAHPS Hospice administrative data files provided by vendors; FFS hospice claims	2019, 2021	For a given hospice and a given quarter, all completed surveys are ranked based on their respective lag times. *Lag time* is the number of days between a decedent's death and the return of the mail survey or the final disposition of the telephone survey. Ranks are averaged in the case of ties. Response percentile is calculated by dividing lag time rank by quarterly sample size. CAHPS Hospice Survey responses were matched with FFS hospice claims data using available beneficiary-level variables.[a]	Hospice balancing (summary CAHPS Hospice Survey score only)

NOTE: SEER = Surveillance, Epidemiology, and End Results.

[a] As CAHPS Hospice Survey data do not contain beneficiary names or identification numbers (for example, HIC, MBI), we linked CAHPS Hospice Survey responses to hospice claims data by matching based on available variables (hospice CCN, beneficiary date of death, date of birth, hospice admission date, primary diagnosis, and sex).

Appendix E. Subgroup Analysis for VBID General Outcomes

Through VBID General, POs have many options to tailor plan benefit packages to promote efficiency, patient-centeredness, and high-value care. In the main text of our report, we grouped all VBID General interventions together for the purposes of evaluating their impact. However, it is possible that impacts vary by the type of interventions offered. In this appendix, we consider whether the relationship between VBID General and the outcomes of interest varied with intervention type. In consultation with CMS, we selected six outcomes and five intervention types for subgroup analyses (Table E.1). Three of the outcomes were measured at the plan level and three at the beneficiary level. We analyzed VBID flexibilities separately from RI, and also conducted analyses of three subtypes of VBID flexibilities (SES targeting, Part D cost sharing reductions, and participation requirements).

Table E.1. VBID General Subgroup Analyses Included, and Unit of Observation Considered

Intervention Type	Enrollment	MAPD Bids	MAPD Premiums	Inpatient Utilization	ED Utilization	Beneficiary Risk Scores
VBID Flexibilities	Plan	Plan	Plan	Beneficiary	Beneficiary	Beneficiary
SES targeting	Plan	Plan	Plan	Beneficiary	Beneficiary	Beneficiary
Part D cost-sharing reductions	Plan	Plan	Plan	Beneficiary	Beneficiary	Beneficiary
Participation requirements	Plan	Plan	Plan	Beneficiary	Beneficiary	Beneficiary
RI	Plan	Plan	Plan	Beneficiary	Beneficiary	Beneficiary

NOTE: We analyzed plan-level outcomes for 2020, 2021, and 2022, and beneficiary-level outcomes for 2020.

Methods

We conducted the subgroup analyses using the same methodology described in Appendix C. For plan-level analyses, this involved using EB to make the comparison group similar to the treatment group, running DD regressions for each relevant VBID General participation pattern (for example, participated in all three years, participated in 2020 only, participated in 2021 and 2022) and weighting the resulting coefficients to get effects for each year. We dropped participation patterns that included fewer than five treatment plans.

We used a similar approach for beneficiary-level analyses; however, because the beneficiary-level analyses focused on 2020 outcomes, we only considered one participation pattern (participated in 2020 or not). Additionally, for beneficiary analyses, we required that treatment and comparison observations were enrolled in the same plan from January 1, 2019, through January 1, 2020.

A plan or beneficiary may be included as a treatment observation in more than one subgroup analysis if it fits into both groups. For example, a VBID Flexibilities plan that made reduced Part D cost-sharing contingent on participation requirements would be included in three of the five subgroup analyses. For the ED utilization subgroup analyses, we adjusted our confidence intervals using the Rambachan and Roth (2023) methodology because of concerns about a possible parallel-trends violation (see Appendix L for more discussion).

Limitations

Our subgroup analysis methodology has several limitations. First, the results for the subgroup analyses will not necessarily average to the all–VBID General result because, for each subgroup analysis, we developed a new set of EB weights to achieve the best balance between the subgroup-specific treatment and comparison sample. Developing new weights increases our confidence that, for each specific subgroup analysis, we have identified the most appropriate comparison group and produced the most accurate estimate. However, it is not necessarily the case that the subgroup analyses will average to the effects reported in the main text.

Second, the sample size for the subgroup analyses is lower than the sample size used in the main analyses, which can lead to increased uncertainty in the results and hence wider confidence intervals. In addition, with lower sample sizes, it can be more difficult to achieve balance. This is particularly true for the plan-level results, and—specifically—for plan-level observations with uncommon participation patterns. While we were able to maintain an average standardized difference (ASD) of less than or equal to 0.2 for the largest participation patterns used in the subgroup analyses, the ASD levels for the subgroup analyses tended to be higher than for the analyses presented in the main text. Because participation in the model test grew exponentially over time, the participation patterns that were most common were (1) participated only in 2022, (2) participated in 2021 and 2022, and (3) participated in all three years. For some uncommon participation patterns, such as participation in 2020 only, we had trouble achieving balance in the plan-level results. We kept these plans in our analysis despite the poor balance if at least five such plans were included in the relevant subgroup. However, we expect that the decision to include these plans had little effect on the overall results because these participation patterns are very rare.

Results

Enrollment

In the main text, we found no statistically significant association between VBID General implementation and enrollment. Table E.2 shows the estimated association between VBID General implementation and enrollment in each year (2020, 2021, and 2022). Most of the results remain statistically insignificant and of modest size, but the finding for the plans that targeted

beneficiaries based on SES is strikingly different from the other results. Specifically, for the SES plans, we estimate very large and statistically or marginally statistically significant effects in all three years. If we exponentiate the coefficients to get percent changes, we find that VBID General was associated with a 32% increase in enrollment in 2020 (95% confidence interval [CI]: –22% to 123%), a 35% increase in 2021 (95% CI: 5% to 74%), and a 17% increase in 2022 (95% CI: –7 to 47%).

These findings may reflect that beneficiaries with low incomes placed a particularly high value on VBID General benefits, influencing their enrollment decisions. This hypothesis aligns with plan and beneficiary perspectives that were described in Chapter 3. We note, however, that it was challenging to achieve balance for the SES subgroup, and we needed to limit the balancing variables to a subset to achieve both acceptable balance (< 0.2 for all outcomes) while maintaining adequate sample size. The balancing variables used in the SES regressions include: Star Rating, for-profit status, MA premium, Part D premium, type of plan, Part D OOP maximum, MA penetration, area-level income, standardized Medicare costs, % dual enrollees, % LIS enrollees, % disabled, located in Puerto Rico, and the outcome trends. If we attempted to run the SES models with the full list of balancing variables described in Appendix D, we either achieved very poor balance or lost substantial sample size. In the balanced regressions with low sample size, the 2021 SES finding was not statistically insignificant, although the point estimate and CI were consistent with a large enrollment impact.

We also estimated a 19% increase in enrollment in VBID Flexibilities plans in 2021 (95% CI: 6 to 33%), which might reflect the strong, positive relationship between SES interventions and enrollment that year (SES interventions are as subset of VBID Flexibilities interventions).

Table E.2. Estimated Associations Between VBID General Interventions and Plan Enrollment, by Subgroup, 2020–2022

Intervention Type	Estimate	Standard Error	95% CI Lower Bound	95% CI Upper Bound	*p*-value	ESS
2020						
VBID Flexibilities	0.089	0.065	–0.038	0.216	0.169	295
SES targeting	0.277	0.267	–0.247	0.802	0.299	39
Part D cost-sharing reductions	0.025	0.061	–0.094	0.145	0.681	352
Participation requirements	0.032	0.062	–0.090	0.154	0.611	348
RI	0.158	0.093	–0.023	0.339	0.088	172
2021						
VBID Flexibilities	0.172	0.059	0.056	0.288	0.004	592
SES targeting	0.300	0.130	0.046	0.555	0.021	184
Part D cost-sharing reductions	–0.001	0.063	–0.124	0.122	0.987	510
Participation requirements	–0.002	0.062	–0.124	0.120	0.976	568
RI	0.023	0.061	–0.096	0.142	0.703	453
2022						
VBID Flexibilities	0.094	0.065	–0.032	0.221	0.144	898
SES targeting	0.154	0.117	–0.076	0.383	0.190	463
Part D cost sharing reductions	0.037	0.088	–0.136	0.209	0.675	879
Participation requirements	–0.117	0.081	–0.276	0.042	0.148	600
RI	–0.032	0.049	–0.129	0.064	0.511	1,003

SOURCE: RAND analysis of CMS enrollment and other data.

MAPD Bids

In Table E.3, we report effects on MAPD bids for subtypes of VBID General. SES interventions once again stand out: There are statistically significant or marginally statistically significant reductions in MAPD bids in all three years. For context, the average MAPD bid is around $887 PMPM in 2022 (Appendix G), so the estimates are generally small relative to the overall bid.

We also found a reduction in MAPD bids among RI plans in 2020, although this relationship did not hold up over time and became positive in 2022. In 2022, we also found statistically significant reductions in MAPD bids for VBID Flexibilities plans and plans with Part D cost-sharing reductions. We found statistically significant increases in bids for plans with participation requirements in both 2021 and 2022.

Table E.3. Estimated Association Between VBID General Interventions and MAPD Bids, by Subgroup, 2020–2022

Intervention Type	Estimate	Standard Error	95% CI Lower Bound	95% CI Upper Bound	*p*-value	ESS
2020						
VBID Flexibilities	0.47	3.38	–6.15	7.08	0.890	663
SES targeting	–15.16	8.51	–31.84	1.51	0.075	66
Part D cost-sharing reductions	7.39	4.13	–0.71	15.49	0.074	370
Participation requirements	6.65	3.92	–1.03	14.32	0.090	582
RI	–14.55	4.68	–23.72	–5.37	0.002	207
2021						
VBID Flexibilities	–2.59	2.91	–8.29	3.10	0.372	976
SES targeting	–19.57	4.89	–29.15	–9.99	<0.001	205
Part D cost-sharing reductions	1.74	3.68	–5.47	8.95	0.637	605
Participation requirements	6.76	3.19	0.52	13.01	0.034	797
RI	3.10	2.95	–2.69	8.89	0.294	537
2022						
VBID Flexibilities	–14.24	2.96	–20.04	–8.43	<0.001	1,286
SES targeting	–37.76	4.64	–46.86	–28.65	<0.001	479
Part D cost-sharing reductions	–10.52	3.19	–16.77	–4.27	<0.001	1,262
Participation requirements	19.32	3.89	11.69	26.95	<0.001	866
RI	10.72	2.20	6.41	15.03	<0.001	1,106

SOURCE: RAND analysis of CMS data.

MAPD Premiums

As in the main text, the relationship between VBID General and MAPD premiums is strongest in 2021 (see Table E.4). For that year, we find positive and statistically significant associations for VBID Flexibilities, SES targeting, and RI. The relationship between VBID General and premiums is largest for plans with SES interventions, for which the monthly PMPM premium increased by $5.10 in 2021 ($p = 0.004$, 95% CI: $1.65 to $8.55). The increase among plans that targeted beneficiaries based on SES may reflect that Part D premiums for beneficiaries with LIS status are paid primarily by CMS rather than the beneficiary. In the interviews described in Chapter 7, representatives from one PO noted that their premiums had increased, but that CMS, rather than beneficiaries, bore the brunt of the costs.

In 2022, the relationship between VBID General implementation and premiums declined for most interventions relative to 2021 values and was not statistically significant (except for a marginally statistically significant increase for plans with Part D interventions). We found statistically no associations between VBID General and MAPD premiums in 2020.

Table E.4. Estimated Associations Between VBID General Interventions and MAPD Premiums, by Subgroup, 2020–2022

Intervention Type	Estimate	Standard Error	95% CI Lower Bound	95% CI Upper Bound	*p*-value	ESS
2020						
VBID Flexibilities	–0.87	1.47	–3.75	2.01	0.554	735
SES targeting	–0.94	2.75	–6.33	4.45	0.733	79
Part D cost-sharing reductions	–0.05	2.51	–4.97	4.87	0.984	403
Participation requirements	–1.53	1.79	–5.04	1.98	0.392	608
RI	0.11	1.44	–2.72	2.94	0.941	216
2021						
VBID Flexibilities	2.22	0.93	0.40	4.04	0.017	1,050
SES targeting	5.10	1.95	1.27	8.92	0.009	222
Part D cost-sharing reductions	2.31	1.49	–0.61	5.22	0.121	672
Participation requirements	–0.70	1.11	–2.87	1.47	0.526	1,010
RI	3.06	1.00	1.09	5.02	0.002	646
2022						
VBID Flexibilities	0.91	0.64	–0.35	2.17	0.158	1,351
SES targeting	1.44	1.22	–0.96	3.83	0.239	504
Part D cost-sharing reductions	1.37	0.87	–0.34	3.07	0.116	1,378
Participation requirements	0.26	1.19	–2.09	2.60	0.831	1,082
RI	0.26	0.56	–0.84	1.36	0.641	1,342

SOURCE: RAND analysis of CMS data.

Risk Scores

In 2020, VBID General implementation was associated with increases in risk scores among targeted beneficiaries for all of the intervention subtypes considered except RI interventions (Table E.5). As discussed in the main text, VBID interventions that increase beneficiaries' interactions with health care providers might create more opportunities for coding diagnoses, leading to higher risk scores.

RI interventions might have had little effect on risk scores because, in 2020, these interventions included a mix of incentives for MTM services, physician visits, preventive screenings, and vaccines. Not all of these approaches required interaction with physicians, and so may not have affected opportunities to code diagnoses as strongly as other interventions.

Table E.5. Estimated Associations Between VBID General Interventions and Beneficiary Risk Scores, by Subgroup, 2020

Intervention Type	Estimate	Standard Error	95% CI Lower Bound	95% CI Upper Bound	*p*-value	ESS
VBID Flexibilities	0.100	0.00	0.09	0.10	<0.001	1,053,220
SES targeting	0.060	0.00	0.05	0.07	<0.001	153,860
Part D cost sharing reductions	0.110	0.00	0.10	0.12	<0.001	324,143
Participation requirements	0.110	0.00	0.11	0.12	<0.001	719,179
RI	0.004	0.00	–0.01	0.02	0.652	65,789

SOURCE: RAND analysis of risk scores derived from HCC data.

Inpatient Utilization

Table E.6 shows results for inpatient stays among targeted beneficiaries by intervention subtype. We find the that effects are positive and statistically significant for VBID Flexibilities and the three subcategories of VBID Flexibilities (SES interventions, Part D cost-sharing, and participation requirements interventions) and for RI.

Tables E.6. Estimated Associations Between VBID General Interventions and Beneficiary-Level Inpatient Stays, by Subgroup, 2020

Intervention Type	Estimate	Standard Error	95% CI Lower Bound	95% CI Upper Bound	*p*-value	ESS
VBID Flexibilities	0.117	0.009	0.100	0.134	<0.001	717,487
SES targeting	0.167	0.017	0.134	0.200	<0.001	135,565
Part D cost-sharing reductions	0.106	0.012	0.082	0.129	<0.001	267,635
Participation requirements	0.098	0.010	0.079	0.117	<0.001	518,832
RI	0.053	0.023	0.008	0.098	0.020	72,025

SOURCE: RAND analysis of Encounter data.

ED Utilization

Table E.7 shows the results for emergency department visits among targeted beneficiaries, using the Rambachan and Roth (2023) procedure to adjust CIs for possible parallel trends violations (please refer to Appendix K for discussion). Results are not statistically significant for VBID Flexibilities overall, VBID Flexibilities with SES targeting, or for RI. For two subgroups—plans with Part D cost-sharing reductions and plans with participation requirements—we find that the increase in ED visits remained statistically significant after the Rambachan and Roth adjustment. We are hesitant to read too much into this effect because the

parallel trends adjustment that we applied used findings for all VBID General plans, not specific subgroups.

Table E.7 also shows that, for the VBID Flexibilities and SES targeting subgroups, the adjusted CIs do not include the estimated coefficient. This lack of overlap could indicate that pre-implementation trends from 2017 through 2019 were not parallel. The method that we use to allow for post-implementation parallel trends violations also incorporates information about pre-implementation differences in group average outcomes, and event-study estimates indicate that ED visits in these subgroups were increasing faster than in the comparison group over the three years leading up to VBID implementation (please refer to Appendix K for further discussion of the methods used here). Accounting for both the pre-implementation difference in group outcome trends and potential post-implementation parallel trends violations leads to a divergence between the original point estimate and the adjusted CI.

Table E.7. Estimated Associations Between VBID General Interventions and Beneficiary-Level Emergency Department Use, by Subgroup, 2020

Intervention Type	Estimate	Standard Error	95% CI Lower Bound	95% CI Upper Bound	*p*-value	ESS
VBID Flexibilities	0.094	N/A	–0.068	0.073	N/A	717,460
SES targeting	0.143	N/A	–0.217	0.016	N/A	135,614
Part D cost-sharing reductions	0.066	N/A	0.014	0.099	N/A	267,598
Participation requirements	0.053	N/A	0.028	0.091	N/A	518,829
RI	–0.024	N/A	–0.117	0.030	N/A	72,025

SOURCE: RAND analysis of encounter data.
NOTE: N/A = not applicable. Standard errors and *p*-values are not produced for the Rambachan and Roth (2023) CIs.

Appendix F. Intervention Summaries

This appendix summarizes the 2020–2022 interventions of participating POs using the information presented in their model test applications and documentation from the model test implementation and monitoring contractor, and, in some instances, using the information shared during PO interviews. It is an updated version of Appendix E from our previous evaluation report (Khodyakov et al., 2022). PO names are deidentified to protect their confidentiality and, where applicable, are carried over from our previous evaluation reports. POs that are no longer in the model test starting from 2020 are not included in this appendix and thus their letters are missing. For some outcomes included in this report, we are measuring the impact of VBID interventions implemented in previous years. Table F.1 identifies which components and subcomponents were implemented by each PO that participated in Phase II of the VBID Model.

Table F.1. VBID Participation POs by Year and Implemented Components and Subcomponents

	2020	2020	2021	2021	2021	2021	2022	2022	2022	2022
PO ID	VBID Flex	R&I	VBID Flex	R&I	Cash Rebates	Hospice	VBID Flex	R&I	Cash Rebates	Hospice
B	X		X				X			
E							X			
G	X		X				X			X
J	X		X				X			
L	X	X	X				X			X
M						X				X
N	X	X	X	X			X	X		
O	X	X	X	X			X	X		
P	X	X	X	X		X	X	X	X	X
Q	X		X				X			
R					X	X	X		X	X
S			X				X			
U		X	X	X			X	X		
V						X				X
W		X	X	X	X	X	X	X	X	X
X						X				X
Y			X	X		X	X	X		X
Z						X				X
AA		X					X			
AC							X			
AD									X	

PO ID	2020 VBID Flex	2020 R&I	2021 VBID Flex	2021 R&I	2021 Cash Rebates	2021 Hospice	2022 VBID Flex	2022 R&I	2022 Cash Rebates	2022 Hospice
AE							X	X		
AF							X			
AG							X			
AH							X		X	
AI										X
AJ										X
AK							X			
AL							X			
AM							X			
AN										X
AO							X	X		
AP							X		X	
AQ		X					X		X	
AR							X			

SOURCE: RAND analysis of VBID Model test application materials and documentation from the model test implementation and monitoring contractor.

In the following section, we provide a more detailed description of each PO's VBID interventions. In each table that summarizes a given PO's interventions, we list the target group (if applicable), year of the intervention (if the PO changed or added interventions between years), and the intervention description.

PO B

PO B participated in the model test from 2020–2022, offering VBID Flexibility interventions (Table F.2). PO B also participated in Phase I of the VBID Model test from 2017 to 2019.

Table F.2. VBID General Subcomponents Offered by PO B

Target Group	Subcomponent	Benefit[s]	Detail
Beneficiaries with COPD and/or diabetes (2020-2022)	VBID Flexibilities	Supplemental benefits	Reduced copays for transportation: $5 per trip for 48 trips (double the standard benefit of $10 per trip for 24 trips)
	VBID Flexibilities	Supplemental benefits	No copays for select dental services: periodontal services provided as part of routine visits and scaling and root planing, and four lifetime periodontal procedures
	VBID Flexibilities	Reduced cost sharing	Reduced coinsurance for diabetic testing supplies and retinal or fundus photography for diabetics
	VBID Flexibilities	High-value providers	Reduced copays for up to four high-value provider specialist visits[b]

SOURCE: RAND analysis of VBID Model test application materials, documentation from the model test implementation and monitoring contractor, and/or PO interviews.
[a] Participation requirement: quarterly contact with care management team through a variety of mechanisms (for example, phone, mail), unless beneficiary's condition is well managed.
[b] All specialists within certain specialty types that treat diabetes or COPD are eligible for the reduced copays (endocrinology, ophthalmology, nephrology, pulmonology, and podiatry).

WHP. These services are delivered by telephone or in-person via annual wellness visits (AWVs) and regular care management programs. PO B conducts outreach about these services for both beneficiaries and providers. PO B offers a $25 gift card each year for beneficiaries who engage in wellness and health care planning (WHP) (for 2021 and 2022). Beneficiaries must complete their AWV within the last year to be eligible to receive this incentive. There are no WHP rewards for providers.

PO C

PO C participated in the model test in 2020 and 2021 (but not in 2022), offering VBID General interventions that targeted two sets of beneficiaries (Table F.3). PO C also participated in Phase I of the VBID Model test from 2017 to 2019.

Table F.3. VBID General Subcomponents Offered by PO C

Target Group	Subcomponent	Benefit	Detail
Beneficiaries who qualify for LIS 1–4 (2020–2021)	VBID Flexibilities	Reduced cost sharing for Part C services	All outpatient mental health visit copays are reduced 50% after beneficiary is identified as LIS
Beneficiaries with CHF and diabetes or COPD (or all 3) (2020-2021)	VBID Flexibilities	Reduced cost sharing for Part C services	$0 Part B nebulizers; do not have to participate in the RI program to receive benefit
	RI	Rewards for completing personal health review and 4 quarterly activities	Up to $200 total: $50 for personal health review; $25 for Q1, Q2, and Q3 activities; $50 for Q4 activity

SOURCE: RAND analysis of VBID Model test application materials, documentation from the model test implementation and monitoring contractor, and/or PO interviews.

WHP. PO C delivers WHP services by telephone, in-person, or online through the AWVs, health risk assessments (HRAs), regular care management programs, or in-home assessments. PO C offered $20 for completing the AWV. There are no WHP rewards for providers. The wellness incentive was increased to $30 for 2021.

PO E

PO E rejoined the model test in 2022, offering VBID General interventions (Table F.4). PO E also participated in Phase I of the VBID Model test from 2017 to 2018.

Table F.4. VBID General Subcomponents Offered by PO E

Target Group	Subcomponent	Benefit	Detail
Beneficiaries who qualify for LIS 1–4 (2022)	VBID Flexibilities	Reduced cost sharing for Part D drugs	$0 cost sharing for all benefit phases

SOURCE: RAND analysis of VBID Model test application materials, documentation from the model test implementation and monitoring contractor, and/or PO interviews.

WHP. The PO delivers WHP services through the AWVs, HRAs, or regular care management programs. There are no rewards for beneficiaries or providers.

PO G

PO G participated in the model test for 2020–2022, offering VBID General interventions (Table F.5) starting from 2020 and expanding them in 2022, and offering the hospice component in 2022 (Table F.6). PO G also participated in Phase I of the VBID Model test from 2017 to 2019.

Table F.5. VBID General Subcomponents Offered by PO G

Target Group	Subcomponent	Benefit	Detail
Beneficiaries with CHF (2020–2022)	VBID Flexibilities	Reduced cost sharing for Part C services	$0 primary care provider (PCP) visits and cardiologist visits
	VBID Flexibilities	Reduced cost sharing for Part D drugs	$0 for specified CHF-related drugs[b]
	VBID Flexibilities	Supplemental benefits	$0 precooked meal deliveries for up to three 14-day periods each year; $0 for up to 24 one-way transportation trips per year for medical appointments; body mass index scale and pulse oximeter; $25 per month for specific foods at specific retailers[c]
Beneficiaries who qualify for LIS 1–4 (2022)	VBID Flexibilities	Reduced cost sharing for Part D drugs	$0 cost sharing for all benefit phases
	VBID Flexibilities	Supplemental benefits	Healthy food cards (with a utility allowance in some markets) with dollar values ranging from $45-75, depending on the plan. Also has bathroom modifications for all plans and a social needs benefit or companion care benefit in some of the plans.

SOURCE: RAND analysis of VBID Model test application materials, documentation from the model test implementation and monitoring contractor, and/or PO interviews.
[a] Eligible beneficiaries are required to engage with a care management team via regular calls or visits, quarterly visits to a PCP, and an annual visit to a cardiologist to receive reduced copays or meal benefits. Plans with transportation benefits have participation requirements as well.
[b] Angiotensin-converting enzyme (ACE) inhibitors, angiotensin receptor blockers (ARBs), hydralazine and isosorbide dinitrate, and mineralocorticoid receptor antagonists, for all Part D benefit phases.
[c] Not available in all plans.

Table F.6. Hospice Subcomponents Offered by PO G

Subcomponent	Eligibility	Benefit	Detail
Palliative care (2022)	Primarily through provider referral or claims algorithm	Care management, access to social and community services, 24/7 support from care team, pain and symptom management, and spiritual and emotional support	—
Transitional concurrent care (TCC) (2022)	—	Access to regular medical benefits deemed appropriate	—
Hospice supplemental benefits (2022)	—	Several support services designed to reduce inpatient admissions including meals (14 per month), transportation (48 one-way trips), and in-home respite care (24 hours per month; four hours at a time)	No cost sharing; must be accessed through in-network providers or vendors

SOURCE: RAND analysis of VBID Model test application materials, documentation from the model test implementation and monitoring contractor, and/or PO interviews.

WHP. PO G delivers WHP services in person or by telephone through AWV, regular care management programs, or in-home assessments. PO G administrators target beneficiaries in care management for these services. PO G does not offer WHP rewards to beneficiaries or providers.

PO J

PO J participated in the model test for 2020–2022, offering VBID Flexibility interventions (Table F.7). PO J also participated in Phase I of the VBID Model test from 2018 to 2019.

Table F.7. VBID General Subcomponents Offered by PO J

Target Group	Subcomponent	Benefit	Detail
Beneficiaries with CHF and/or CAD (2020-2022)	VBID Flexibilities	Reduced cost sharing:	$0 cost sharing for prescription drugs used to treat CHF and CAD. $0 occurs through all Part D benefit phases except deductible: • CHF medications include ACE/ARBs, beta blockers, diuretics, and vasodilators • CAD medications include antiplatelet drugs, statins, ACE/ARBs, and beta-blockers in tiers 1–4

SOURCE: RAND analysis of VBID Model test application materials, documentation from the model test implementation and monitoring contractor, and/or PO interviews.

WHP. PO J delivers WHP services by mail, by telephone, or online through a vendor that provides multiple mailings throughout the year to inform beneficiaries about filling out advance directives (ADs). PO J also has an advance care planning (ACP) program to document and communicate wishes about end-of-life medical decisions and to help beneficiaries discuss end-of-life planning with providers and family members. Beneficiaries in a VBID-participating plan who complete the ACP program receive a onetime $25 incentive (available in each year of the model test). There are no WHP rewards for providers. There was an initial health assessment questionnaire for the WHP component in 2020, but this was removed from the WHP component for 2021. In 2020, the program was targeted to VBID members, but in 2021, it was rolled out to all members.

PO L

PO L participated in the model test from 2020–2022, offering VBID General interventions targeted to multiple subgroups of beneficiaries (Table F.8), and it added the Hospice component in 2022 (Table F.9).

Table F.8. VBID General Subcomponents Offered by PO L

Target Group	Subcomponent	Benefit	Detail
Beneficiaries with dementia (2020)	VBID Flexibilities	Supplemental benefits	Reduced cost sharing on in-home care. Up to 8 hours per month for $0 copayment
Beneficiaries not adherent to diabetes, hypertension, or cholesterol medications (2020)	RI	Rewards for successful engagement (for example, telephone consultation for adherence counseling and to address barriers) in a medication management program	$50 for two successful engagements; annual maximum of $150 per member if member takes medications for all three conditions
Beneficiaries with LIS levels 1–4 (2021–2022)	VBID Flexibilities	Reduced cost sharing for Part D drugs[a]	$0 cost sharing for all Part D drugs in all phases, excluding the deductible
		Supplemental benefits[a]	Healthy foods allowance of $25–$55 per month, depending on the plan, at specific retailers; 2022 amounts range from $25 per month to $225 per month, with most being $100-150 per month; nonmedical transportation (48 one-way trips to approved locations)

SOURCE: RAND analysis of VBID Model test application materials, documentation from the model test implementation and monitoring contractor, and/or PO interviews.
[a] Not available in all plans.

Table F.9. Hospice Subcomponents Offered by PO L

Subcomponent	Eligibility	Benefit	Detail
Palliative care (2022)	Primarily through provider referral or claims algorithm	Care management, access to social and community services, 24/7 support from care team, pain and symptom management, and spiritual and emotional support	—
TCC (2022)	—	Access to regular medical benefits deemed appropriate	—
Hospice supplemental benefits (2022)	—	None	—

SOURCE: RAND analysis of VBID Model test application materials, documentation from the model test implementation and monitoring contractor, and/or PO interviews.

WHP. These services are delivered by telephone, in-person, or online through an internal care management program that provides an extra layer of support through phone outreach from nurses and social workers on how to initiate advance care planning. PO L representatives also

encourage the discussion of ACP with PCPs. There are no WHP rewards and incentives offered to beneficiaries or providers for 2021 or 2022.

PO M

PO M participated in the model test in 2021 and 2022, offering the Hospice component (Table F.10).

Table F.10. Hospice Subcomponents Offered by PO M

Subcomponent	Eligibility	Benefit	Detail
Palliative care (2021-2022)	Primarily through provider referral, claims algorithm, or beneficiaries electing hospice	Care management, access to social and community services, 24/7 support from care team, pain and symptom management, and spiritual/emotional support	—
TCC (2021-2022)	—	Access to regular medical benefits deemed appropriate	Outpatient only
Hospice supplemental benefits (2021-2022)	—	None	—

SOURCE: RAND analysis of VBID Model test application materials, documentation from the model test implementation and monitoring contractor, and/or PO interviews.

WHP. PO M delivers WHP services in person or by telephone through AWVs, care management programs, and nurse outreach to talk with beneficiaries about ACP. PO M also offers provider training and an AWV toolkit for screening beneficiaries for ACP needs. There are no rewards or incentives for beneficiaries. PO M encourages PCPs to engage in education with patients on the importance of ACP and the annual completion of an ACP document, and they can earn a quality bonus for an ACP measure (up to $1,250 per year).

PO N

PO N participated in the model test for 2020–2022, offering VBID General interventions to several targeted subgroups (Table F.11).

Table F.11. VBID General Subcomponents Offered by PO N

Target Group	Subcomponent	Benefit	Detail
Beneficiaries with diabetes (identified with both diagnosis code and fill of a specific diabetes medication) AND are eligible for LIS level 1 or 2 (2020–2021)	VBID Flexibilities	Reduced cost sharing for Part D drugs	$0 for 90-day supply of eligible antihypertensive, statin, and antidiabetic medications
Beneficiaries with diabetes (identified with fill of specific diabetes medication) except if the beneficiary was taking metformin[a] (2020–2022)	RI	Reward for quarterly check-in with the medication adherence program	$15 per quarterly check-in; maximum $60 per year
Beneficiaries with LIS levels 1–3 (2021–2022)	VBID Flexibilities	Supplemental benefits	Healthy food allowance of $190 per quarter via card that can be used at selected outlets; maximum $760 per year
Beneficiaries with LIS levels 1–2 (2022)	VBID Flexibilities	Reduced cost sharing for Part D drugs	$0 cost sharing for all drugs with 84-day supplies (chronic maintenance medications) and Part D vaccines
Multiple criteria (2022)	RI	Rewards for completing a variety of wellness activities	Beneficiaries can earn up to $60 per completion of wellness activities such as receiving vaccines and completing AWV.

SOURCE: RAND analysis of VBID Model test application materials, documentation from the model test implementation and monitoring contractor, and/or PO interviews.
[a] If beneficiary is taking metformin, a diagnosis code is required since metformin can be used to treat prediabetes and other conditions.

WHP. These services are delivered in-person, by telephone, or online through AWVs, HRAs, care management programs, or in-home assessments. New beneficiaries are onboarded and educated regarding incentives for completing an AWV, and existing beneficiaries receive mailed communications, outreach phone calls, and reminders from staff. PO N offers $25 for completing the AWV ($50 for 2022) and $15 for completing the in-home assessment. There are no WHP rewards offered to providers.

PO O

PO O participated in the model test for 2020-2022, offering several different VBID General interventions (Table F.12).

Table F.12. VBID General Subcomponents Offered by PO O

Target Group	Subcomponent	Benefit	Detail
Beneficiaries with multiple chronic conditions (at least six of a specific set)[a]	VBID Flexibilities (2020)	Reduced cost sharing for Part C services[b]	$0 outpatient cardiac/intensive cardiac rehabilitation; $0 outpatient pulmonary rehabilitation; $0 in-home visits with designated provider
	VBID Flexibilities (2021–2022)	Reduced cost sharing for Part C services[c]	$0 copay specialist visits for first three specialist visits in a year
	RI (2021–2022)	Reward for engaging with designated in-home provider for the first time	$10 reward; beneficiaries already engaged with provider do not receive the incentive

SOURCE: RAND analysis of VBID Model test application materials, documentation from the model test implementation and monitoring contractor, and/or PO interviews.
[a] Beneficiaries must live in specific counties.
[b] PO O decided to roll out these benefits to all beneficiaries in these plans for 2021.
[c] Participation requirements: Beneficiary must engage with the designated in-home provider to receive this benefit, which means allowing the provider to conduct an initial in-home visit (this was modified during the COVID-19 pandemic to include a telephone visit).

WHP. PO O delivers WHP services in-person or online through a variety of platforms, including AWVs, HRAs, care management programs, or in-home assessments. There is a $10 incentive for beneficiaries to complete an AD. There are no WHP rewards for providers.

PO P

PO P participated in the model test from 2020–2022, offering the VBID General (Table F.13) and Hospice components (Table F.14).

Table F.13. VBID General Subcomponents Offered by PO P

Target Group	Subcomponent	Benefit	Detail
Beneficiaries with LIS levels 1–4	VBID Flexibilities (2020–2022)	Supplemental benefits	Healthy foods allowance of $25–$100 monthly (up from max of $50 for 2020,[a] $75 for 2021, and $100 for 2022) depending on the plan: food card for purchases at national chain grocery stores; funds expire at the end of each month
	VBID Flexibilities (2022)	Reduced cost sharing for Part D drugs	$0 cost sharing for all drugs in deductible and initial coverage phases
Beneficiaries eligible for an MTM program (2020–2022)	RI	Reward for completion of interactive medication review (review of current medications highlights potential problematic medication use)	$25 gift card for completion of interactive medication review and $25 for medication adherence consultation (the latter was removed for 2022)
Beneficiaries with COPD using a maintenance inhaler	VBID Flexibilities (2020–2022)	Reduced cost sharing for Part D drugs	Specific Part D Tier 3 inhalers[b] cost $0 for 90-day supply or $10 for 30-day supply at retail pharmacies; one free spacer for the inhalers was added for 2022
	RI (2021–2022)	Reward for completion of MTM program	$75 gift card to large national retailer after completing three sessions on how to take the medications properly and basic disease management
None (all beneficiaries) (2022)	Cash Rebates		Rebates range from $25–$50 monthly ($300–$600 annual max), depending on the plan

SOURCE: RAND analysis of VBID Model test application materials, documentation from the model test implementation and monitoring contractor, and/or PO interviews.
[a] In 2020, some plans offered a midyear benefit enhancement by providing additional funds to ease the impacts of the COVID-19 pandemic.
[b] Participation requirement: participation in COPD MMT or disease management program. Cost-sharing amounts are applied to the deductible and initial coverage phase.

Table F.14. Hospice Subcomponents Offered by PO P

Subcomponent	Eligibility	Benefit	Detail
Palliative care (2021–2022)	Provider referral or claims algorithm to identify at-risk members	Telephone or in-person support (depending on market) from an interdisciplinary care team[a]	—
TCC (2021–2022)	—	31-day ramp-down of appropriate medical services	—
Hospice supplemental benefits[b] (2021–2022)	—	Non–primarily health-related services	$500 for services, such as bathroom grab bars and meal preparation
	—	Respite care	40 hours in eight-hour increments

SOURCE: RAND analysis of VBID Model test application materials, documentation from the model test implementation and monitoring contractor, and/or PO interviews.
[a] The interdisciplinary care team coordinates care between providers, social services, and other nonclinical supports.
[b] Must select in-network providers to be eligible.

WHP. These services are delivered by telephone, in-person, or online through AWVs, HRAs, care management programs, and in-home assessments. PO P also offers a digital ACP tool to all beneficiaries to create an AD document. Beneficiaries with serious illness (identified through a claims data algorithm) are targeted for WHP outreach. There are no WHP rewards for beneficiaries or providers.

PO Q

PO Q participated in the model test for 2020–2022, offering VBID Flexibilities (Table F.15).

Table F.15. VBID General Subcomponents Offered by PO Q

Target Group	Subcomponent	Benefit	Detail
Beneficiaries with LIS levels 1–4 (2020-2022)	VBID Flexibilities[a]	Reduced cost sharing for Part C services	$0 for nearly all Part C services[b]
		Supplemental benefits	Over-the-counter (OTC) benefit card of $200 per quarter for quarter 1–quarter 3 and then $300 for quarter 4 in 2020 (boosted during COVID-19 for all MA beneficiaries); $200 in 2021 and 2022

SOURCE: RAND analysis of VBID Model test application materials, documentation from the model test implementation and monitoring contractor, and/or PO interviews.
[a] Participation requirement: beneficiaries must select a PCP at a specific high-value provider to receive reduced cost sharing on other services.
[b] The PCP manages the beneficiary's care, similar to a care management program.

WHP. PO Q delivers WHP services by telephone or in-person through a variety of platforms, including care management programs, in-home assessments, HRAs, AWVs, and collaboration with local skilled nursing facilities. PO Q educates PCPs to include WHPs as part of the AWV. It includes community involvement through local partnerships to provide end-of-life conversation training and support. While PO Q does not offer an incentive to beneficiaries for WHP directly, it offers a $25 gift card for beneficiaries to complete their AWVs. There are no WHP rewards for providers.

PO R

PO R participated in the model test from 2021–2022, offering both the VBID General (Table F.16) and Hospice components (Table F.17).

Table F.16. VBID General Subcomponents Offered by PO R

Target Group	Subcomponent	Benefit	Detail
None (all beneficiaries) (2021–2022)	Cash Rebates		$50 or $160 monthly ($600 or $1,920 per year), depending on the plan, delivered through a debit card
Dual-eligible beneficiaries (2022)	VBID Flexibilities	Supplemental benefits	24 trips to either medical or nonmedical destinations

SOURCE: RAND analysis of VBID Model test application materials, documentation from the model test implementation and monitoring contractor, and/or PO interviews.

Table F.17. Hospice Subcomponents Offered by PO R

Subcomponent	Eligibility	Benefit	Detail
Palliative care (2021–2022)	Provider referral or claims analysis. Beneficiary must have life-threatening illness with less than 12 months to live, have caregiver support at home, and be in functional decline or otherwise fail to meet hospice criteria	24/7 care team support, ACP discussions, social services and community resources, psychosocial and spiritual support, pain and symptom management, medication reconciliation, and caregiver support	—
TCC (2021–2022)	—	Covered medical services as needed	—
Hospice supplemental benefits[a] (2021–2022)	—	In-home support	One four-hour visit per week
	—	Respite care and hospice drugs	No cost sharing

SOURCE: RAND analysis of VBID Model test application materials, documentation from the model test implementation and monitoring contractor, and/or PO interviews.
[a] Only for beneficiaries using in-network hospice.

WHP. These services are delivered by telephone, in-person, or online via AWVs, HRAs, regular care management program interactions, in-home assessments, and education and outreach to beneficiaries and providers. There are no WHP rewards for providers or beneficiaries.

PO S

PO S participated in the model test in 2021 and 2022, offering VBID General (Table F.18).

Table F.18. VBID General Subcomponents Offered by PO S

Target Group	Subcomponent	Benefit	Detail
Beneficiaries with LIS levels 1–3 (2021–2022)	VBID Flexibilities	Supplemental benefits	OTC benefit card or healthy food allowance of $145 monthly via a card that can be used to purchase OTC items or a specific list of health foods at selected retailers; for 2022, added option to spend funds on the internet and changed the allowance to $100 or $158 depending on PBP

SOURCE: RAND analysis of VBID Model test application materials, documentation from the model test implementation and monitoring contractor, and/or PO interviews.

WHP. These services are delivered in-person, by telephone, through regular mailings, or online. Examples include the AWV, HRAs, care management programs, a self-guided ACP program through a vendor-provided digital platform, or conversations with a PCP and/or

specialist. There are no rewards and incentives for beneficiaries. PCPs may receive up to $20 per beneficiary for conducting and documenting ACP.

PO T

PO T participated in the model test in 2021, offering the Hospice component (Table F.19).

Table F.19. Hospice Subcomponents Offered by PO T

Subcomponent	Eligibility	Benefit	Detail
Palliative care (2021)	Provider referral	Care management, access to social and community services, 24/7 support from care team, pain and symptom management, medication reconciliation, caregiver and spiritual and emotional support	—
TCC (2021)	—	All regular plan medical benefits	—
Hospice supplemental benefits[a] (2021)	—	Respite care and hospice drugs	No cost sharing

SOURCE: RAND analysis of VBID Model test application materials, documentation from the model test implementation and monitoring contractor, and/or PO interviews.
[a] Only for beneficiaries using in-network providers.

WHP. PO T delivers WHP services in-person, by telephone, or online through AWVs, HRAs, care management programs, and in-home assessments. PO T does not offer WHP rewards for beneficiaries or providers.

PO U

PO U participated in the model test from 2020-2022, offering VBID General (Table F.20).

Table F.20. VBID General Subcomponents Offered by PO U

Target Group	Subcomponent	Benefit	Detail
Beneficiaries with diabetes and at least one mental health diagnosis	RI (2020)	Reward for completion of diabetes screening activities	$10 gift card for each activity completed (testing HbA1c level, glucose testing, foot or eye exam, and medical attention for nephropathy)
All beneficiaries in plan who have not yet received specific vaccines	RI (2020–2021)	Reward for receiving vaccines	$25 gift card for each vaccine (shingles; tetanus, diphtheria, and pertussis; hepatitis A or B; meningococcal), up to maximum of $100; amount increased to $50 for 2021 for a total of $200
Beneficiaries meeting CMS eligibility criteria for medication therapy management	RI (2020–2022)	Reward for engaging with the comprehensive or targeted medication review	$25 per quarter for engagement; increased to $50 in 2021
Beneficiaries with fall risk[a]	VBID Flexibilities (2021–2022)	Supplemental benefits	$0 cost sharing for comprehensive fall risk evaluation

SOURCE: RAND analysis of VBID Model test application materials, documentation from the model test implementation and monitoring contractor, and/or PO interviews.
[a] This is determined through provider referral, care management team referral, or a claims algorithm. The claims algorithm uses a 12-month look-back for diagnoses of repeated falls or a history of falls (codes R26.6 or Z91.81).

WHP. This PO delivers WHP services via telephone, online, or in-person through AWVs, HRAs, care management programs, and in-home assessments, and also through education for providers and beneficiaries, including monthly mailers and emails and in-person member events. Information about ACP is available on the plan's website. The PO offers $25–50 for completion of the AWV and $25 for an HRA (but these incentives are not VBID-specific and are part of an existing Part C RI program). There are no rewards and incentives for providers.

PO V

PO V participated in the model test in 2021 and 2022, offering the Hospice Benefit component (Table F.21).

Table F.21. Hospice Benefit Subcomponents Offered by PO V

Subcomponent	Eligibility	Benefit	Detail
Palliative care (2021–2022)	Beneficiaries diagnosed with serious illness, hospitalized with life expectancy of 12 months or less	Comprehensive care assessments, 24/7 care team support, ACP discussions, access to social services and community resources, psychosocial and spiritual support, pain and symptom management, medication reconciliation, caregiver support	—
TCC (2021–2022)	Beneficiaries with cancer, ESRD, or end-stage liver disease (subset of hospice-eligible). They must seek TCC, and the provider must agree with and support the treatment plan and goals of care	Treatments, such as chemotherapy, blood transfusions, dialysis, and paracentesis, for disease states mentioned in eligibility criteria	—
Hospice supplemental benefits[a] (2021–2022)	—	Respite care and hospice drugs[a]	No cost sharing

SOURCE: RAND analysis of VBID Model test application materials, documentation from the model test implementation and monitoring contractor, and/or PO interviews.
[a] Drugs included in the hospice supplemental benefit are for symptom control and pain relief.

WHP. These services are delivered via telephone, in-person, or online through AWV, HRAs, regular care management programs, in-home assessments, and beneficiary education through a partner provider. Providers are trained to discuss end-of-life care planning. The plan uses proactive outreach efforts in ambulatory clinics, email campaigns, and other media channels. PO V does not offer WHP incentives for beneficiaries or providers.

PO W

PO W participated in the model test in 2020–2022,[2] offering VBID General (Table F.22). Starting from 2021, PO W offered Hospice components (Table F.23).

[2] PO AH acquired some of PO W's contracts, so we classify these contracts separately due to their different interventions.

Table F.22. VBID General Subcomponents Offered by PO W

Target Group	Subcomponent	Benefit	Detail
Beneficiaries with diabetes and/or CHF and recent hospital visits (either ED or inpatient)	VBID Flexibilities (2021–2022)	Supplemental benefits	New technologies—medical devices: Beneficiaries with diabetes can receive a continuous glucose monitoring device (requires provider monitoring). Beneficiaries with CHF can receive a remote patient-monitoring device (requires provider monitoring—CHF benefit removed for 2022)
	RI (2020–2022)	Rewards for a variety of screenings, specialist appointments, and care management activities	Maximum $130 per year, plus $20 for AD completion, for total possible reward of $150; screenings must be completed at PO's one-stop-shop clinics[a]
None (all beneficiaries)	Cash Rebates (2021–2022)		$75 or $130 per month ($900 or $1,560 per year) depending on plan, which can be used for purchases or cash withdrawals. 2022 amounts updated to $75–145 per month; $900–1,740 annual maximum. Delivered through a debit card.

SOURCE: RAND analysis of VBID Model test application materials, documentation from the model test implementation and monitoring contractor, and/or PO interviews.
[a] These are multidisciplinary clinics with additional nonclinical staff, such as social workers and nutritionists.

Table F.23. Hospice Benefit Subcomponents Offered by PO W

Subcomponent	Eligibility	Benefit	Detail
Palliative care (2021–2022)	Beneficiaries with a diagnosis of a life-threatening illness and a prognosis of less than six months to live, trouble with a variety of functional scales specified in application, and a caregiver at home; also identified through claims data algorithm	24/7 care team support, ACP discussions, social services and community resources, psychosocial and spiritual support, pain and symptom management, medication reconciliation, and caregiver support	—
TCC[a] (2021–2022)	—	Services will be identified as appropriate, reflective, and based on enrollees' (and/or caregivers') needs and preferences as identified and documented in the plan of care developed by the care management's interdisciplinary team	—
Hospice supplemental benefits	—	None	—

SOURCE: RAND analysis of VBID Model test application materials, documentation from the model test implementation and monitoring contractor, and/or PO interviews.
[a] Only for beneficiaries using in-network hospice.

WHP. PO W delivers WHP services via telephone, in-person, or online through AWVs, HRAs, care management programs, and in-home assessments. Additionally, the PO creates individualized care plans for all beneficiaries, which include WHP care plans that are updated during regular provider visits. For 2021, some beneficiaries enrolled in participating plans are eligible to receive a $20 gift card for WHP activities. PO W does not offer WHP rewards for providers.

PO X

PO X participated in the model test in 2021 and 2022, offering the Hospice Benefit component (Table F.24).

Table F.24. Hospice Benefit Subcomponents Offered by PO X

Subcomponent	Eligibility	Benefit	Detail
Palliative care (2021–2022)	Advanced illness management algorithm to predict those who may die within 12 months, or provider referral	24/7 care team support, ACP discussions, social services and community resources, psychosocial and spiritual support, pain and symptom management, medication reconciliation, and caregiver support	—
TCC (2021–2022)	—	Limited to specific medical services for cancer, cardiac-related conditions, dementia, respiratory-related conditions, or chronic kidney disease	Services provided for up to one month after hospice election.
Hospice supplemental benefits (2021–2022)	—	Respite care and hospice drugs	No cost sharing

SOURCE: RAND analysis of VBID Model test application materials, documentation from the model test implementation and monitoring contractor, and/or PO interviews.

WHP. PO X delivers WHP in person through regular care management programs and in-home assessments or by telephone through monthly outreach by care managers. The PO has a rewards program outside VBID in which a beneficiary may earn a reward for completing an AD (one activity of multiple where the maximum reward is $200 annually).

PO Y

PO Y participated in the model test in 2021 and 2022, offering both VBID General (Table F.25) and the Hospice Benefit component (Table F.26).

Table F.25. VBID General Subcomponents Offered by PO Y

Target Group	Subcomponent	Benefit	Detail
Beneficiaries with diabetes[a] (2021–2022)	VBID Flexibilities	Reduced cost sharing for Part D drugs	Tier 2 copays for diabetes drugs: $0 for 30-day supply; Tier 3 oral, noninsulin drugs: $25 copay for 30-day supply (deductible excluded, other benefit phases included depend on the plan)[b]
	RI	Rewards for completing diabetic screenings	$10 for completing each of three diabetic screenings (HbA1c testing, nephropathy, eye exam); $30 maximum per year

SOURCE: RAND analysis of VBID Model test application materials, documentation from the model test implementation and monitoring contractor, and/or PO interviews.
[a] Participation requirement: beneficiaries must participate in a care management program.
[b] Plans vary in regard to which phases of the Part D benefit the reduced cost sharing applies.

Table F.26. Hospice Benefit Subcomponents Offered by PO Y

Subcomponent	Eligibility	Benefit	Detail
Palliative care (2021–2022)	Provider referral or claims-based algorithm	24/7 care team support, ACP discussions, social services and community resources, psychosocial and spiritual support, pain and symptom management, medication reconciliation, and caregiver support	Available in three major care settings (inpatient, home, and clinic services)
TCC (2021–2022)	—	Medical services for ESRD, oncology, infusion therapies, pulmonary, liver disease, rheumatology, and rehabilitation services	Covers all curative care for up to 30 days after beneficiary elects hospice with eight rehab visits in the 60 days after electing hospice
Hospice supplemental benefits (2021–2022)	—	Safety modifications	Home and bathroom safety devices
	—	Meal support	One meal delivered per day to the member's home for a maximum of 60 meals
	—	Transportation	For ongoing hospice care occurring outside the member's home

SOURCE: RAND analysis of VBID Model test application materials, documentation from the model test implementation and monitoring contractor, and/or PO interviews.

WHP. PO Y delivers WHP services via telephone or in-person through several mechanisms, including regular care management programs and ongoing education and outreach for beneficiaries and providers. There are no WHP rewards for beneficiaries or providers.

PO Z

PO Z participated in the model test in 2021 and 2022, offering the Hospice Benefit component (Table F.27).

Table F.27. Hospice Benefit Subcomponents Offered by PO Z

Subcomponent	Eligibility	Benefit	Detail
Palliative care (2021–2022)	Provider referral or claims algorithm	Comprehensive care assessments, access to social and community resources, 24/7 care team support, pain/symptom management, medication reconciliation, and caregiver support	—
TCC (2021–2022)	—	Radiation and enteral nutrition therapy, cancer curative therapies	—
Hospice supplemental benefits (2021–2022)	—	Respite care	No cost sharing and an increase of two days for the benefit (to maximum of seven days)
	—	Hospice drugs	No cost sharing
	—	Enteral or parenteral formula	No cost sharing

SOURCE: RAND analysis of VBID Model test application materials, documentation from the model test implementation and monitoring contractor, and/or PO interviews.

WHP. These services are delivered by telephone, in-person, or online through the AWV or the regular care management programs. Care managers engage beneficiaries in ACP discussions, coordinate directly with providers, or refer beneficiaries to their PCP for ACP discussions. All beneficiaries are eligible to receive an incentive for WHP as part of an existing rewards program outside the VBID Model test. Beneficiaries can earn points for completing a PCP visit during which ACP is discussed. There is no WHP incentive for providers.

PO AA

PO AA participated in the model test in 2020 and 2022, offering VBID General (Table F.28).

Table F.28. VBID General Subcomponents Offered by PO AA

Target Group	Subcomponent	Benefit	Detail
Beneficiaries eligible for 100% LIS premium subsidy with two or more hospital admissions (2020)	RI	Reward for completion of tailored health intervention as part of a care management intervention	$100 gift card per quarter; $400 per year maximum
Beneficiaries who qualify for LIS 1–4 (2022)	VBID Flexibilities	Reduced cost sharing for Part D drugs	$0 cost sharing for all generic Part D drugs, applies to all benefit phases excluding deductible

SOURCE: RAND analysis of VBID Model test application materials, documentation from the model test implementation and monitoring contractor, and/or PO interviews.

WHP. PO AA delivers WHP services through HRAs, regular care management interactions, in-home assessments, and regular mailings. An algorithm is used to identify beneficiaries with serious illness who receive targeted WHP outreach through the care management program. Beneficiaries receive rewards of up to $165 for completing wellness activities through an existing rewards program; rewards can be redeemed from a catalog of items.

PO AB

PO AB participated in the model test in 2020, offering VBID General (Table F.29).

Table F.29. VBID General Subcomponents Offered by PO AB

Target Group	Subcomponent	Benefit	Detail
Beneficiaries eligible for LIS 1–4 (2020)	VBID Flexibilities[a]	Supplemental benefits	$0 transportation (up to 48 trips/year) and $0 meals (21 meals over each two-week occurrence, up to 84 per year)
Beneficiaries with diabetes, hypertension, or CAD who are nonadherent to at least one medication for these conditions (2020)	RI	Reward for completion of activities	$25 for social needs assessment, $5 quarterly for disease management education, $10 for completing “learn and earn” and confirming medication has been taken as prescribed; maximum of $150 annually

SOURCE: RAND analysis of VBID Model test application materials, documentation from the model test implementation and monitoring contractor, and/or PO interviews.
[a] Participation requirement: Beneficiaries must call PO to complete social needs assessment.

WHP. All MA enrollees receive information about ACP in regular plan mailings. The plan requires network PCPs to document existing ADs in the enrollee's medical records. PO AB does not offer WHP rewards to beneficiaries or providers.

PO AC

PO AC participated in the model test in 2022, offering VBID General (Table F.30).

Table F.30. VBID General Subcomponents Offered by PO AC

Target Group	Subcomponent	Benefit	Detail
Beneficiaries who qualify for LIS 1–4 (2022)	VBID Flexibilities	Reduced cost sharing for Part D drugs	$0 cost sharing for all drugs in all benefit phases, excluding deductible

SOURCE: RAND analysis of VBID Model test application materials, documentation from the model test implementation and monitoring contractor, and/or PO interviews.

WHP. PO AC delivers WHP services through AWVs, Medicare HRAs, care management programs, regular mailings, and in-home assessments. There are no incentives for beneficiaries nor providers.

PO AD

PO AD participated in the model test in 2022, offering VBID General (Table F.31).

Table F.31. VBID General Subcomponents Offered by PO AD

Target Group	Subcomponent	Benefit	Detail
None (all beneficiaries) (2022)	Cash Rebates		$30 per month delivered through a debit card

SOURCE: RAND analysis of VBID Model test application materials, documentation from the model test implementation and monitoring contractor, and/or PO interviews.

WHP. All MA enrollees receive information about WHP services and ADs through several modalities, including AWVs, HRAs, regular care management programs, or in-home assessments. Beneficiaries can receive up to $260 for completing a suite of wellness activities (of which completing a care plan is one activity). Providers can receive $150 for engaging beneficiaries in WHP.

PO AE

PO AE participated in the model test in 2022, offering VBID General (Table F.32).

Table F.32. VBID General Subcomponents Offered by PO AE

Target Group	Subcomponent	Benefit	Detail
Musculoskeletal conditions (2022)	VBID Flexibilities	Virtual, on-demand care management	Care management program has physical therapy, health coaching, pain management, assistance with scheduling appointments
		Supplemental benefits	Home modifications: up to $2,300 for easy-grip doorknobs, $2,000 for permanent ramps
Dementia plus one of five conditions (ESRD, advanced cancer, COPD, CHF, end-stage liver disease) *and* an acute hospital stay within the past 30 days (2022)	VBID Flexibilities	Supplemental benefits	In-home assistance, up to 20 hours per month, two times per year (one month at a time)
Diabetes (2022)	VBID Flexibilities	Care management	$0 cost sharing for care management, health coaching, and exercise physiologist to help with diabetes self-care
	RI	Gift card reward	$25 for completing six to eight sessions of a diabetes program (exact number is up to care manager to decide)

SOURCE: RAND analysis of VBID Model test application materials, documentation from the model test implementation and monitoring contractor, and/or PO interviews.

WHP. All MA enrollees receive information about WHP services and ADs through several modalities, including AWVs, HRAs, regular care management programs, and in-home assessments. Beneficiaries can receive a $25 incentive to complete ACP. There are no rewards for providers.

PO AF

PO AF participated in the model test in 2022, offering VBID General (Table F.33).

Table F.33. VBID General Subcomponents Offered by PO AF

Target Group	Subcomponent	Benefit	Detail
Beneficiaries who qualify for LIS 1–4 (2022)	VBID Flexibilities	Reduced cost sharing for Part D drugs	$0 cost sharing for all drugs in all benefit phases, excluding the deductible

SOURCE: RAND analysis of VBID Model test application materials, documentation from the model test implementation and monitoring contractor, and/or PO interviews.

WHP. WHP services are delivered by phone primarily through the Medicare HRAs, AWVs, regular care management programs and in-home assessments. There are no rewards and incentives for beneficiaries or providers.

PO AG

PO AG participated in the model test in 2022, offering VBID General (Table F.34).

Table F.34. VBID General Subcomponents Offered by PO AG

Target Group	Subcomponent	Benefit	Detail
Beneficiaries who qualify for LIS 1–4 (2022)	VBID Flexibilities	Healthy food card	$50 to $147 per month, depending on plan

SOURCE: RAND analysis of VBID Model test application materials, documentation from the model test implementation and monitoring contractor, and/or PO interviews.

WHP. All MA enrollees receive information about WHP services and ADs through several modalities, including AWVs, HRAs, regular mailings, and regular care management programs. There are no rewards nor incentives for beneficiaries or providers.

PO AH

PO AH participated in the model test in 2022, offering VBID General (Table F.35).

Table F.35. VBID General Subcomponents Offered by PO AH

Target Group	Subcomponent	Benefit	Detail
Beneficiaries who qualify for LIS 1–4 (2022)	VBID Flexibilities	Reduced cost sharing for Part D drugs	$0 cost sharing for all drugs in all benefit phases
	VBID Flexibilities	Supplemental benefits	$50 to $100 for food card and transportation (number of trips depends on plan)
	VBID Flexibilities	Supplemental benefits	Depending on plan, beneficiary chooses one or two supplemental benefits per contract year. Options include home or bathroom assistive devices, in-home support, healthy meal delivery, expanded transportation benefit, pest control, healthy food card, or additional allowance for dental/vision/hearing.
None (all beneficiaries) (2022)	Cash Rebates	Delivered through a debit card	$30 per month

SOURCE: RAND analysis of VBID Model test application materials, documentation from the model test implementation and monitoring contractor, and/or PO interviews.

WHP. All MA enrollees receive information about WHP services and ADs through several modalities, including AWVs, HRAs, regular care management programs, or in-home assessments. The PO also offers an online digital advance care planning platform, "My Directives," with which beneficiaries can complete an AD online and share with providers and health representatives at their discretion. There are no rewards for beneficiaries nor providers.

PO AI

PO AI participated in the model test in 2022, offering the Hospice Benefit component (Table F.36).

Table F.36. Hospice Benefit Subcomponents Offered by PO AI

Subcomponent	Eligibility	Benefit	Detail
Palliative care (2022)	CMS' hospice eligibility criteria; special focus on beneficiaries living in institutional settings	Comprehensive care assessments, access to social and community resources, 24/7 care team support, pain/symptom management, medication reconciliation, and caregiver support	—
TCC (2022)	—	Some medical treatments included for the first 30 days	—
Hospice supplemental benefits (2022)	—	Expanded day limits and $0 cost sharing for hospice care, including drugs and inpatient respite care	—

SOURCE: RAND analysis of VBID Model test application materials, documentation from the model test implementation and monitoring contractor, and/or PO interviews.

WHP. All MA enrollees receive information about WHP services and ADs through several modalities, including AWVs, HRAs, regular care management programs, and in-home assessments. There are no incentives for beneficiaries or providers.

PO AJ

PO AJ participated in the model test in 2022, offering the Hospice Benefit component (Table F.37).

Table F.37. Hospice Benefit Subcomponents Offered by PO AJ

Subcomponent	Eligibility	Benefit	Detail
Palliative care (2022)	Provider referral or claims algorithm	Comprehensive care assessments, access to social and community resources, 24/7 care team support, pain/symptom management, medication reconciliation, and caregiver support	—
TCC (2022)	—	Medical treatments included for first 30 days	Beneficiary must select in-network provider
Hospice supplemental benefits (2022)	—	Expanded day limits and $0 cost sharing for hospice care, including drugs and inpatient respite care	—

SOURCE: RAND analysis of VBID Model test application materials, documentation from the model test implementation and monitoring contractor, and/or PO interviews.

WHP. All beneficiaries receive information about WHP services and ADs through several modalities, including AWVs, HRAs, regular communications, and regular care management programs. Beneficiaries can receive between $265 and $280 (depending on plan) for completing

a variety of wellness activities, of which completing an AD is one. Providers can earn up to $460 annually for each patient for closing preventive care gaps in their attributed population.

PO AK

PO AK participated in the model test in 2022, offering VBID General (Table F.38).

Table F.38. VBID General Subcomponents Offered by PO AK

Target Group	Subcomponent	Benefit	Detail
Beneficiaries who qualify for LIS 1–4 (2022)	VBID Flexibilities	Reduced cost sharing for Part D drugs	$0 cost sharing for all drugs in all benefit phases
	VBID Flexibilities	Reduced cost sharing for Part D drugs	Insulin only: $0 cost sharing in deductible, initial coverall limit and coverage gap phases

SOURCE: RAND analysis of VBID Model test application materials, documentation from the model test implementation and monitoring contractor, and/or PO interviews.

WHP. All MA enrollees receive information about WHP services and ADs through several modalities, including AWVs, HRAs, regular mailings, online portals, and regular care management programs. Beneficiaries can receive between $80 and $95 (depending on the plan) to complete a variety of wellness activities, such as completing an HRA.

PO AL

PO AL participated in the model test in 2022, offering VBID General (Table F.39).

Table F.39. VBID General Subcomponents Offered by PO AL

Target Group	Subcomponent	Benefit	Detail
Beneficiaries who qualify for LIS 1–4 (2022)	VBID Flexibilities	Reduced cost sharing for Part D drugs	$0 cost sharing for all drugs in all benefit phases
	VBID Flexibilities	Supplemental benefits	Healthy food card of $30 to 60 per month depending on the plan
	VBID Flexibilities	Supplemental benefits	$0 copayment for companionship services

SOURCE: RAND analysis of VBID Model test application materials, documentation from the model test implementation and monitoring contractor, and/or PO interviews.

WHP. All MA enrollees receive information about WHP services and ADs through several modalities, including AWVs, HRAs, and regular care management programs. Beneficiaries can receive a $10 incentive to complete an AD. There are no rewards for providers.

PO AM

PO AM participated in the model test in 2022, offering VBID General (Table F.40).

Table F.40. VBID General Subcomponents Offered by PO AM

Target Group	Subcomponent	Benefit	Detail
Beneficiaries who qualify for LIS 1–4 (2022)	VBID Flexibilities	Reduced cost sharing for Part D drugs	$0 cost sharing for all drugs in all benefit phases, excluding the deductible

SOURCE: RAND analysis of VBID Model test application materials, documentation from the model test implementation and monitoring contractor, and/or PO interviews.

WHP. WHP services are delivered by phone primarily through the Medicare HRA. Plan representatives will reach out to all beneficiaries regarding the HRA and WHP services. There are no rewards and incentives for beneficiaries or providers.

PO AN

PO AN participated in the model test in 2022, offering the Hospice Benefit component (Table F.41).

Table F.41. Hospice Benefit Subcomponents Offered by PO AN

Subcomponent	Eligibility	Benefit	Detail
Palliative care (2022)	Provider referral or claims algorithm	Comprehensive care assessments, access to social and community resources, 24/7 care team support, pain/symptom management, medication reconciliation, and caregiver support	—
TCC (2022)	—	PO develops care plan after beneficiary elects hospice	Services provided will be dependent on beneficiary needs
Hospice supplemental benefits (2022)	—	Transportation	200 hours of transportation

SOURCE: RAND analysis of VBID Model test application materials, documentation from the model test implementation and monitoring contractor, and/or PO interviews.

WHP. All MA enrollees receive information about WHP services and ADs through several modalities, including AWVs, HRAs, regular communications, and regular care management programs. Beneficiaries can receive up to $125 for completing a variety of activities, of which completing ACP is one. There are no rewards for providers.

PO AO

PO AO participated in the model test in 2022, offering VBID General (Table F.42).

Table F.42. VBID General Subcomponents Offered by PO AO

Target Group	Subcomponent	Benefit	Detail
Beneficiaries who qualify for LIS 1–4 (2022)	VBID Flexibilities	Reduced cost sharing for Part D drugs	$0 cost sharing for all drugs in all benefit phases
Beneficiaries eligible for MTM services (2022)	RI	Comprehensive medication review	$15 for completing medication review
	RI	A reward per fill of cholesterol, oral diabetes, or hypertension medication	Annual max of $120; $10 per 30-day fill per medication class

SOURCE: RAND analysis of VBID Model test application materials, documentation from the model test implementation and monitoring contractor, and/or PO interviews.

WHP. Beneficiaries receive information through several modalities, including AWVs, HRAs, regular mailings, online portals, and regular care management programs. The PO has an RI program that exists outside VBID for a variety of screenings and wellness visits (up to an annual maximum of $600). Beneficiaries can earn $15 for completing the HRA. Providers can also receive rewards through an incentive program for completing screenings and other wellness activities (PCPs are paid between $3.50 and $17.25 PMPM depending on the type of screening).

PO AP

PO AP participated in the model test in 2022, offering VBID General (Table F.43).

Table F.43. VBID General Subcomponents Offered by PO AP

Target Group	Subcomponent	Benefit	Detail
Beneficiaries who qualify for LIS 1–4 (2022)	VBID Flexibilities	Reduces cost sharing for Part D drugs	$0 cost sharing for all drugs in all benefit phases
None (all beneficiaries) (2022)	Cash Rebates		$15 to 45 per month (up to $540 annual maximum)

SOURCE: RAND analysis of VBID Model test application materials, documentation from the model test implementation and monitoring contractor, and/or PO interviews.

WHP. All MA enrollees receive information about WHP services and ADs through several modalities, including AWVs, HRAs, regular mailings, online portals, and regular care management programs. Beneficiaries can receive a $25 incentive to complete an AWV. PO AP also offers providers $150 or $300 to conduct AWVs.

PO AQ

PO AQ participated in the model test in 2020 and 2022, offering VBID General (Table F.44).

Table F.44. VBID General Subcomponents Offered by PO AQ

Target Group	Subcomponent	Benefit	Detail
Beneficiaries with specific chronic conditions and at least $700 in total monthly drug spending (2020)	RI	Reward for engaging in telephone educational interventions	$10 per quarter incentive, up to four times per year; gift card is sent at the end of the year
Dual-eligible beneficiaries (2022)	VBID Flexibilities	Supplemental benefits	$500 for air conditioner or refrigerator, home assistance (3 visits per quarter), nonmedical transportation (number of trips vary by plan), and phone allowance (varies by plan
Chronic conditions: cardiovascular disease, chronic heart failure, and/or diabetes (2022)	VBID Flexibilities	Supplemental benefits	Home assistance (three visits per quarter), nonmedical transportation (number of trips vary by plan), and phone allowance (varies by plan
None (all beneficiaries) (2022)	Cash Rebates		$25 to $210 per month ($300 to $2,520 annual maximum)

SOURCE: RAND analysis of VBID Model test application materials, documentation from the model test implementation and monitoring contractor, and/or PO interviews.

WHP. PO AQ delivers WHP services through HRAs and other ongoing modalities, such as in-home assessments, regular mail, and telephone outreach. There is a $30 incentive for providers to conduct ACP discussions.

PO AR

PO AR participated in the model test in 2022, offering VBID General (Table F.45).

Table F.45. VBID General Subcomponents Offered by PO AR

Target Group	Subcomponent	Benefit	Detail
Beneficiaries who qualify for LIS 1–4 (2022)	VBID Flexibilities	Reduced cost sharing for Part D drugs	$0 cost sharing for all drugs in all benefit phases
	VBID Flexibilities	Supplemental benefits	Free wellness activities at specific providers that include a broad variety of services: fitness, personal care, grooming, or meals

SOURCE: RAND analysis of VBID Model test application materials, documentation from the model test implementation and monitoring contractor, and/or PO interviews.

WHP. PO AR delivers WHP services through the AWV, Medicare HRAs, care management programs, and in-home assessments. There are no incentives for beneficiaries or providers.

Appendix G. Descriptive Information on Participating Plans

This appendix provides descriptive statistics for VBID General– and Hospice-participating POs and plans, compared with eligible nonparticipating POs and plans. Table G.1 shows descriptive statistics for participating and eligible nonparticipating PO characteristics.

Table G.1. Participating PO Characteristics, 2022

Characteristic	VBID GeneralPOs	Hospice-Participating POs	Eligible Nonparticipating POs
Number of POs	27	13	108
% BCBS affiliate	18.5	30.8	22.2
% state	77.8	46.2***	83.3
% regional	3.7	15.4	8.3
% national	18.5	38.5***	8.3
% for-profit	55.6	46.2	39.8
MA penetration rate, mean (SD)	54.1 (9.4)*	53.1 (6.1)	49.2 (9.8)
Median income, mean (SD)	29,327 (4,596)*	31,047 (4,109)	31,292 (4,358)
Eligible plan enrollment in PO, mean (SD)	562,715 (1,360,000)	1,140,000 (1,840,000)***	191,772 (719,738)

SOURCE: RAND analysis of VBID participating plan and other data. The complete list of data sources and variables is in Appendix D.
NOTES: ***, **, and * indicate that the VBID column is statistically significantly different from the eligible nonparticipating column at the 0.1%, 1%, and 5% levels, respectively.

Table G.2 shows descriptive statistics for participating and eligible nonparticipating plan characteristics.

Table G.2. Participating Plan Characteristics, 2022

Characteristic	VBID General Plans	Hospice-Participating Plans	Hospice-Participating Plans, Mainland U.S. Only	Eligible Nonparticipating Plans
Number of plans	859	109	81	2344
% plans offering Part D	99.7***	94.5	95.1	89.9
% plans that are D-SNPs	43.6***	18.4***	11.1	7.3
% plans that are C-SNPs	2.8**	2.8	0*	5.5
% plans that are I-SNPs	0.35***	0.92	1.2	3.5
% plans with $0 premium	33.1***	66.1**	56.8	54.4
Total monthly premium (SD)	24.3 (26)	19.3 (37.3)	24.5 (40.6)	26.9 (44.5)
OOP maximum (SD)	5,333 (1,973)***	4,803 (1,552)	5,235.8 (1,497.5)	4,989 (1,864)
% rural counties in service area (SD)	7.4 (10.9)	9.9 (14.8)**	12.6 (16.3)***	6.7 (11.6)
% suburban counties in service area (SD)	17.9 (14.3)	16.3 (13.1)	18.9 (14.2)	17.8 (16.9)
% urban counties in service area (SD)	74.8 (21.2)	73.9 (20.9)	68.5 (21.8)**	75.5 (24.1)
% dual beneficiaries (SD)	52.3 (43.4)***	25.4 (37.1)	19.5 (31.0)	20.5 (29.2)
% LIS-eligible beneficiaries (SD)	54.7 (40.6)***	19.7 (27.8)*	25.6 (29.8)	26.8 (29.2)
Average age (SD)	68.4 (4.5)***	71.4 (3.9)	71.4 (4.0)	71.6 (4.1)
% male (SD)	43.0 (6.5)***	45.2 (8.9)	43.6 (7.8)**	46.6 (9.4)
% White, non-Hispanic (SD)	51.1 (24.6)***	44.8 (30.6)***	59.2 (21.1)	61.4 (22.4)
% Black (SD)	14.9 (13.7)***	9.3 (12.6)	12.2 (13.4)	9.9 (11.7)
% Hispanic (SD)	14.9 (21.3)***	27.8 (35.6)***	7.8 (11.0)	9.9 (13.7)
% API (SD)	2.7 (5.1)***	3.8 (10.4)	4.9 (11.9)	3.7 (7.4)
% AI/AN (SD)	0.6 (0.9)***	0.7 (1.5)***	0.8 (1.6)***	0.4 (0.6)
MA bids (SD)	858.1 (120.2)*	726.8 (204)***	837.1 (84.1)	849.6 (91.8)
Part D bids (SD)	38.7 (20.1)	42.6 (19.6)*	45.9 (20.4)***	37.6 (22.3)
MA premium (SD)	4.6 (17.1)***	6.5 (21.9)	7.9 (24.7)	11.1 (29.2)
Part D premium (SD)	19.8 (16.8)*	13.5 (22.2)	17.5 (23.9)	17.6 (22.4)
Cost of MSB (SD)	77.2 (65.2)***	58.8 (51.2)***	43.7 (41.7)	38.1 (27.3)

Characteristic	VBID General Plans	Hospice-Participating Plans	Hospice-Participating Plans, Mainland U.S. Only	Eligible Nonparticipating Plans
MA rebate dollars amount (SD)	170.9 (74.1)***	192.7 (80.5)***	161.4 (61.1)	154.3 (83.7)
Administrative costs (SD)	152.1 (47.4)***	132.2 (68.7)	135.1 (78.4)	130.1 (49.3)
% PDSS model participants (SD)	43.8***	60.6***	62.9***	35.7
% offers UF	10.8	30.3***	32.1***	8.6
% offers SSBCI	28.2***	44.0***	32.1**	20.0
% offers new PHSRB	98.1***	93.6*	93.8*	85.2
% PPO	29.5	26.6	33.3	29.5
Average Star Rating (SD)	4.2 (0.4)	4.3 (0.4)	4.3 (0.4)	4.2 (0.5)
Average total enrollment (SD)	7,689 (12,773)***	9,404 (12,146)**	8,772 (9,883)*	5,671 (11,662)

SOURCE: RAND analysis of VBID-participating plan and other data. The complete list of data sources and variables is in Appendix D.
NOTES: ***, **, and * indicate that the VBID column is statistically significantly different from the eligible nonparticipating column at the 0.1%, 1%, and 5% levels, respectively.

Appendix H. VBID Eligibility

This appendix discusses the PO and plan eligibility criteria to develop our sample used for analyses in this report and describes the process for crosswalking segments and plans to the final year of analysis used for each unit of analysis (beneficiary, plan and contract).

PO and Plan Eligibility

We describe the criteria used to select plan benefit packages (hereafter, *plans*) for our analytic sample, including participating plans and nonparticipating plans that are eligible for the pool of comparison plans.

The Innovation Center establishes the MA VBID eligibility criteria (Center for Medicare & Medicaid Innovation, Centers for Medicare & Medicaid Services, 2019; Center for Medicare & Medicaid Innovation, Centers for Medicare & Medicaid Services, 2020a; Center for Medicare & Medicaid Innovation, Centers for Medicare & Medicaid Services, 2020b; Centers for Medicare & Medicaid Services, 2021b; Centers for Medicare & Medicaid Services, 2021c) which include the following key criteria that were the same for the VBID General and hospice components of the model test:

- Plans must be an MA or MAPD (no stand-alone Part D plans).
- Eligible plan types were limited to Coordinated Care Plans (health maintenance organization [HMO], HMO-Point of Service [POS], local PPO, or regional PPO) and SNPs (C-SNP, D-SNP, or I-SNP).
- POs must have at least one plan with 2,000 enrollees.
    - The Innovation Center removed this criterion for 2021 and 2022.
- Plans needed to be offered in three prior open enrollment periods (OEPs).
    - The Innovation Center relaxed this criterion for 2021 and 2022 to require only that a PO have at least one plan that had been offered in three prior enrollment periods.
- Plans also had to have sufficiently high performance in the application year, which included:
    - not being under sanction
    - the contract for the plan had to have at least a three-star overall rating
    - the plan could not be a "consistently low"–performing plan in the Medicare Plan Finder
    - the organization could not be an outlier in the Past Performance Review.

- Segmented plans were not allowed to enter a plan with a different intervention across segments.[3]

We made several modifications to these criteria based on conversations with the Innovation Center in which we learned that exceptions were granted, and also because the criteria shifted slightly between 2020 and 2021 (as noted previously). Table H.1 shows the eligibility criteria that we applied, the datasets used to assess the criteria, and the date of the data used to make the eligibility assessment. Because VBID applications are due the year prior to the model test year, most of the data used to make the eligibility determination come from the year or two before participation began. Our major changes were to:

- exclude I-SNPs from the comparison group because there are no I-SNP participants in 2020 or 2021, and the beneficiaries in these plans are very different from those enrolled in VBID participating plans. We included the I-SNPs for 2022 because there are several I-SNPs participating for 2022.
- apply several criteria to the PO level rather than at the MA Organization or contract level when the criterion was not specific at the level to which it applied.
- not use two of the performance criteria because data were not uniformly available in all years and the Innovation Center also granted exceptions to these criteria.

[3] POs are allowed to divide a given plan's service area into multiple segments and vary plan design features across these geographic units.

Table H.1. Criteria and Data Sources Used to Identify VBID-Eligible Plans

Criteria Category	Specific Criteria	RAND Application of Criterion	Dataset Used for Assessment	Date for 2020 Assessment	Date for 2021 Assessment	Date for 2022 Assessment
Plan Type	Must be HMO, HMO-POS, local PPO, regional PPO, or any SNP (C-SNP, D-SNP, or I-SNP*)	Must be HMO, HMO-POS, local PPO, regional PPO, or C-SNP/D-SNP	Contract information file (plan, state, county level), SNP data	July 2019	July 2020	July 2021
Enrollment[a]	At least one plan for the applicant organization has at least 2,000 enrollees; this criterion was dropped for 2021	Applied at the PO level for 2020 only	Enrollment file (plan, state, county level)	July 2019	N/A	N/A
Experience	At least one plan in the organization had three-plus years of experience (that is, available in at least three OEPs).	PO must have at least one contract offered for three or more years, using January 1, 2020, or January 1, 1/2021 as the date to determine the three years in operation	Contract information file (plan, state, county level)	July 2019	July 2020	July 2021
Performance[b]	Plan's contract has at least a 3-star overall rating	Applied the 3-star rating at the contract level	Star ratings, summary rating tab, overall rating	2019 (Fall 2018 release)	2020 (Fall 2019 release)	2021 (Fall 2020 release)
Performance	Plan does not have a "consistently low performing" icon on Medicare Plan Finder	Applied at the contract level	Star ratings, low performing contracts tab	2019 (Fall 2018 release)	2020 (Fall 2019 release)	2021 (Fall 2020 release)
Performance	Organization offering plan is not under sanction by CMS	Not applied	Star ratings, summary rating tab, sanction deduction (column G)	N/A	N/A	N/A

Criteria Category	Specific Criteria	RAND Application of Criterion	Dataset Used for Assessment	Date for 2020 Assessment	Date for 2021 Assessment	Date for 2022 Assessment
Performance	Organization offering plan is not an outlier in CMS' Past Performance Review	Not applied	Past performance review outlier results	N/A	N/A	N/A

SOURCE: RAND analysis of publicly available CMS data on eligibility criteria (Centers for Medicare & Medicaid Services, 2023b).
NOTE: N/A indicates outcome was not assessed.
[a] We use July enrollment and contract information files because this is the time of year when enrollment generally stabilizes.
[b] The Star Ratings performance data for a given year are released in two files: Spring of the rating year and fall of the previous year (so the 2019 Star Ratings data were released in April 2019 and November 2018). The purpose for the fall release is so that the data can be used on the Medicare Plan Finder for open enrollment, which occurs in the fall of every year prior to the plan year beginning. We use the fall release because that was available to the plans at the time of their application.

Analytic Sample

After applying the eligibility criteria, we made several additional exclusions to achieve our analytic sample used for the EB and subsequent analyses.

- ***ESRD SNPs***: We excluded ESRD C-SNPs because the beneficiary populations are very different and there were no participating ESRD C-SNPs from 2020 to 2022.
- ***Previous MA VBID Model participants***: We excluded plans that previously participated in VBID from 2017 through 2019 and are no longer participating. These plans' decisions to not participate in 2020 align with the first year of participation for this evaluation, and we would be unable to disentangle the effect because of participation in 2020 from the effect of plans no longer participating if they were included.
- ***Part B only:*** Some MA plans offer Part B services only (no Part A or D), and we excluded these plans because there are no Part B–only VBID participants from 2020 to 2022.
- ***1876 Cost plans:*** There were several eligible plans that had previously been an 1876 Cost plans but transitioned during the pre-participation period to being a Coordinated Care Plan; we excluded these because 1876 Cost plans are not eligible for the model test.

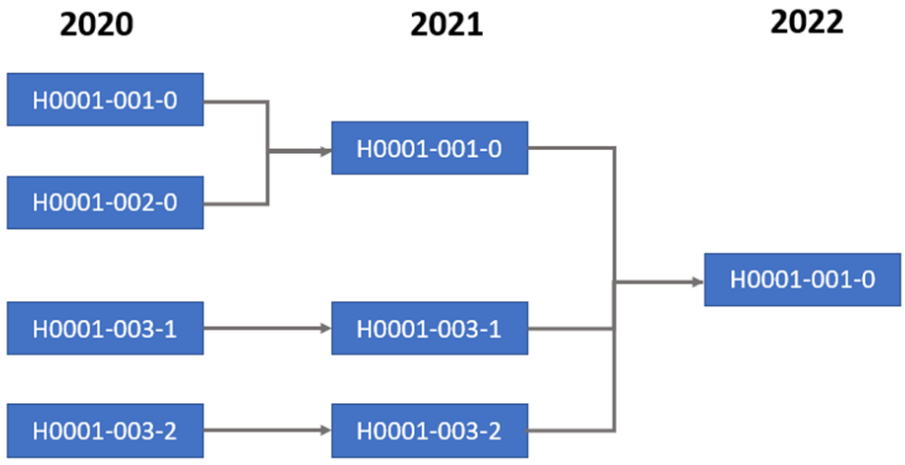
New or discontinued participating VBID plans contributed data for descriptive analyses, but only contributed data for DD analyses if they have at least one year of pre and post data for the particular model year. For example, a new plan participating in VBID in 2020 would not contribute to DD analyses for 2020 but would contribute data for 2021 plan-level analyses. For the comparison pool only, we excluded plans that ceased operation in 2020 or 2021 and therefore have no post-VBID implementation data.

Plan Eligibility over Time

POs are allowed to change their contract, plan, and segment identification (ID) numbers over time for administrative, merger and acquisition, or other reasons, which requires us to crosswalk plans to their counterparts in previous and subsequent years to conduct our analyses. Within a given service area, CMS generally prohibits splitting a plan into two plans from one year to the next, although CMS does allow for some exceptions to this rule. However, CMS allows two plans to be consolidated into one plan within a service area. CMS also allows plans to either reduce or expand their service areas. We used the service area–level crosswalk to generate the crosswalk files that we used for the analyses described in this report.[4] We first created a crosswalk file at the segment level, and then aggregated the crosswalk to the plan level because our analyses are conducted at the plan level. Creation of a segment-level crosswalk as an initial step was important because segments can change over time both within and across plans. Tracking segments over time enabled us to more accurately assign outcomes and plan characteristics to both the segment and, ultimately, the plan level.

Figure H.1 shows an example of how merging segments can be crosswalked together. The H-numbers are the contract IDs (for example, H0001) and the three numbers after the dash are the plan numbers (for example, -001). The numbers after the second dash are the segment numbers (for example, -1). From 2020 to 2021, H001-001 and -002 consolidate to one plan, H001-001. From 2021 to 2022, a plan with two segments (H001-003-1 and H001-003-2) consolidates into H001-001. This is also an example of how three plans (-001, -002 and -003) consolidate into one plan from 2020 to 2022.

Figure H.1. Example of Segment-Level Crosswalking, 2020–2022



[4] We used the CMS service area–level crosswalk file from CMS HPMS.

Figure H.2 shows how segments roll up to the plan level and how the segment-level information would appear at the plan level.

Figure H.2. Example of Plan-Level Crosswalking After Merger (derived from Figure H.1)

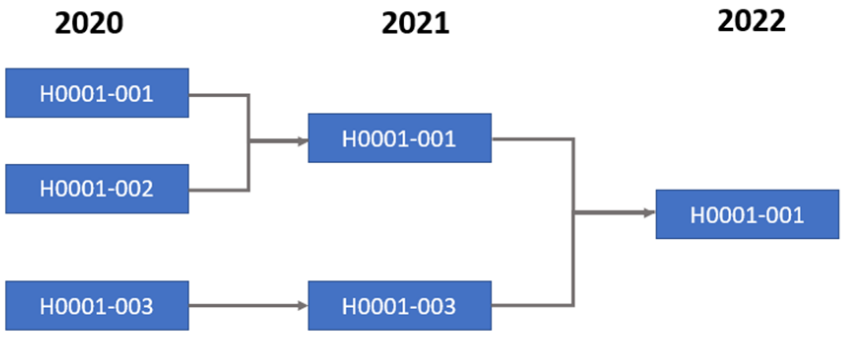


Figure H.3 shows the reverse process for how a plan splitting into multiple segments can be crosswalked together. H0002-001 splits into two segments from 2020 to 2021. H0002-002 has one segment that merges into H0002-001 in 2022 as a third segment. Figure H.4 shows how the segment-level information rolled up to the plan level.

Figure H.3. Example of Plans Splitting into Multiple Segments

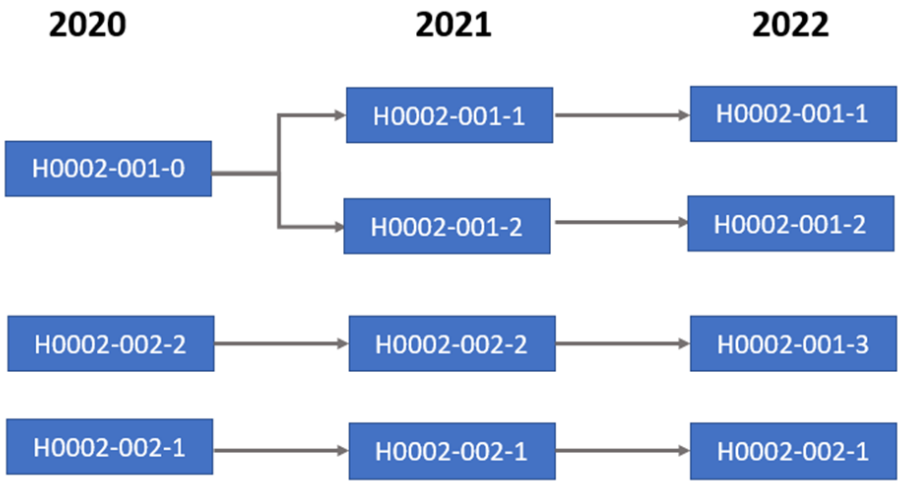


Figure H.4. Example of Plan-Level Crosswalk After Plan Splits into Multiple Segments

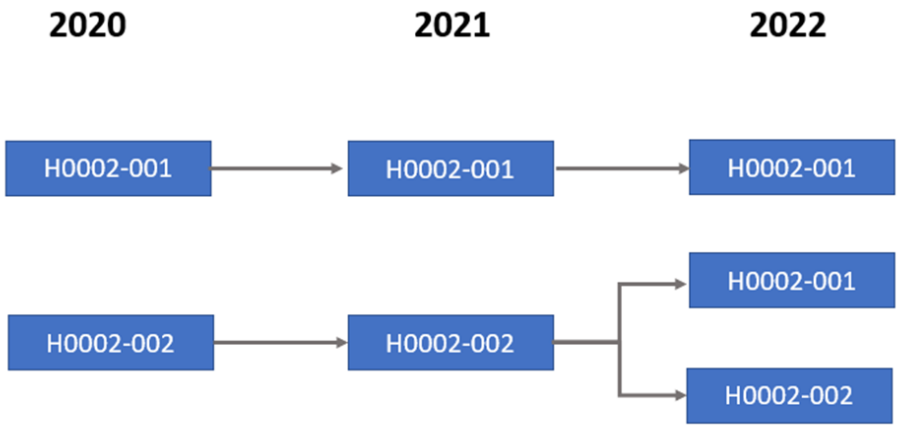
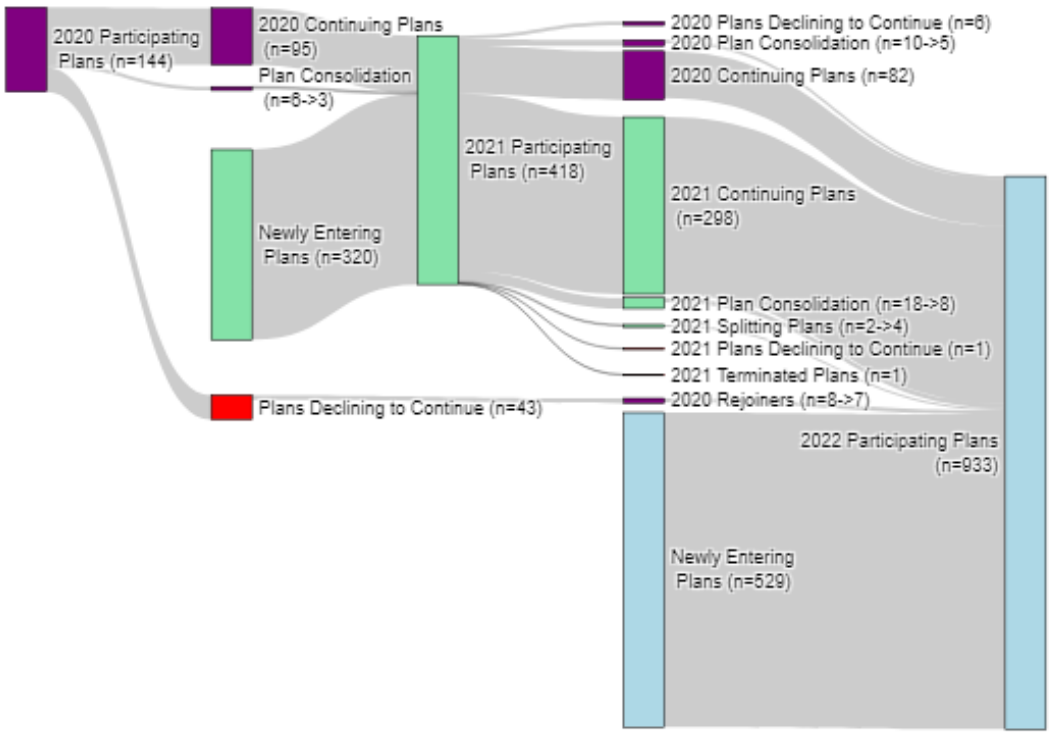


Figure H.5 shows the complexity of the consolidation and splitting of VBID-participating plans over time. Each group of participating plans contains both continuing and new plans to the model test. Many plans use the same contract and plan numbers over time; however, Figure H.5 shows how some plans stop participating, consolidate with others, or split apart, and how new plans join the model test.

Figure H.5. VBID Participating Plan Status, 2020–2022



For our plan-level analyses, we crosswalk plans to their 2022 contract-plan-segment ID, because that is the latest year of data used for the plan-level quantitative analyses for this report. We crosswalk plans to the 2020 contract and plan number for beneficiary analyses and we crosswalk plans to the 2021 contract and plan numbers for contract-level analyses, because these were the final years of analysis used in this report for these units of analysis. We aggregate variables across crosswalked plans in a given year using one of the following methods:

- ***Parent organizations, contract number, and plan number***: We use the plan-level crosswalk to assign the parent organization, contract number, and plan number of the final year used in the analyses in this report to all crosswalked plans.
- ***Participation status, intervention description flags, and participation in other initiative flags:*** We use the segment-level crosswalk and assign the plan the flag value if at least one segment had a 1 for the flag (meaning they had the intervention or were participating). For example, if at least one segment was a VBID Model test participant, we assign all crosswalked segments to the participant status in the given year.
    - We make one exception to this rule for two nonparticipants with large enrollment in 2020 that consolidated with 2020 participating plans in 2021. The nonparticipating plans had at least 57% of the total enrollment (participating plan 2020 enrollment plus nonparticipating plan 2020 enrollment). Because the majority of the beneficiaries in these consolidated plans were not exposed to the intervention in 2020, we removed these plans from the analysis for 2020. Both plans contribute data to the 2021 and 2022 participating plan sample.
- ***All other variables***: We use a segment-level crosswalk to derive the enrollment weighted mean plan characteristics variables (such as average risk score or out-of-pocket maximum). The values for consolidating segments and plans are simply aggregated to the 2022 plan ID using the enrollment (measured in beneficiary months) in each segment as the weight. Splitting plans requires a more complex procedure. For a two-year pair (for example, 2017 and 2018), if a segment splits, we take the enrollment proportion across the segments in the later year of the pair (2018 in this example) and assign the 2017 enrollment according to the proportion of enrollment across the two segment IDs in 2018. In other words, we take the proportion of the enrollment after the split and apply it to the year before the split. The 2017 enrollment for the two split plans sums to the actual 2017 enrollment. This process then repeats for subsequent year pairs up to 2022. These enrollment values become the weights for splitting other characteristics.

Appendix I. Plan-Level Enrollment Analysis

This appendix describes the methods and regression results supporting the enrollment-related findings discussed in Chapter 3 (for VBID General) and Chapter 11 (for Hospice).

Analytic Considerations

Plan enrollment was measured on July 1 of each year. Plans that reported zero enrollment for a given year were excluded from the regression analysis for that year. The association between VBID participation and plan enrollment was evaluated for 2020, 2021, and 2022 using DD analysis and entropy weighting, as described in Appendix C.

Enrollment was analyzed on the logarithmic scale, as was done in the previous report, because the distribution of enrollment is highly skewed, which could lead to undue influence placed on outlying plans. The logarithmic version of the DD model presented in Appendix C is:

$$\log(y_{pti}) = \alpha_p + \eta_t + \beta_t \cdot DID_{pt} + \delta_t X_{pti} + \varepsilon_{pti} \quad \text{(Equation I.1)}$$

where the model coefficient (β_t) represents the change in the average logarithm of enrollment. The following equation estimates the percent change reported in Chapter 3:

$$p_t = (\exp(\beta_t) - 1) * 100 \quad \text{(Equation I.2)}$$

where p_t is the percent change in enrollment for VBID participation at time t.

Predicted enrollment, as displayed in Figures 3.1 and 3.2, is estimated from the aforementioned DD model using the following equation:

$$\widehat{y_t} = \exp\left(\frac{\widehat{\sigma}^2}{2}\right) \exp\left(\widehat{\log(y_t)}\right) \quad \text{(Equation I.3)}$$

where $\hat{\sigma}^2$ is the unbiased estimator of σ^2.

Summary Statistics for Enrollment

Table I.1. displays the distribution of July plan enrollment in 2019, the year before the start of the VBID intervention. VBID General plans that participated in VBID in either 2020, 2021, or 2022 had on average 7,450 enrollees (SD = 11,443, median = 3,526) in 2019. Hospice-participanting plans in 2021 or 2022 had 10,403 enrollees (SD = 14,397, median = 4,931). Eligible comparison plans averaged slightly fewer enrollees, with an average of 6,392 (SD = 12,657, median = 2,170) in 2019.

Table I.1. Mean, Standard Deviation, and Median of Plan Enrollment Prior to VBID Participation, 2019

	VBID General	Hospice	Comparison
Mean	7,450	10,403	6,392
SD	11,443	14,397	12,681
Median	3,526	4,931	2,170
N	600	80	1,755

SOURCE: RAND analysis of CMS and other data.

Group-Specific Difference-in-Differences Regression Results

Plan-level enrollment results from the difference-in-differences model are in Tables I.2. Each combination of VBID participation is represented in the rows. The results for 2020, 2021, and 2022 are in the columns (2021 and 2022 for Hospice). For example, the first row in Table I.2 shows the results for plans that participated only in 2022. The regression results for the year(s) of participation are displayed in the corresponding columns (2022, in this case).

Table I.2. Difference-in-Differences Model Results for VBID General and the Hospice Benefit Component: Plan-Level Enrollment (logarithmic scale)

Participant Group	2020 Est.	2020 SE	2020 95% CI LB	2020 95% CI UB	2020 *p*-value	2021 Est.	2021 SE	2021 95% CI LB	2021 95% CI UB	2021 *p*-value	2022 Est.	2022 SE	2022 95% CI LB	2022 95% CI UB	2022 *p*-value	ESS
VBID General																
2022 only	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	−0.030	0.062	−0.152	0.091	0.622	691
2021 and 2022	N/A	N/A	N/A	N/A	N/A	0.031	0.057	-0.082	0.143	0.593	-0.034	0.063	-0.157	0.090	0.592	529
2020, 2021, and 2022	0.100	0.064	−0.024	0.225	0.115	0.236	0.087	0.066	0.406	0.007	0.220	0.098	0.027	0.413	0.025	379
2020 only	−0.026	0.103	−0.229	0.176	0.798	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	70
2020 and 2022	−0.035	0.236	−0.498	0.427	0.881	N/A	N/A	N/A	N/A	N/A	0.493	0.451	−0.391	1.378	0.274	18
2020 and 2021	−0.258	0.114	−0.482	−0.035	0.023	−0.811	0.250	−1.300	−0.322	0.001	N/A	N/A	N/A	N/A	N/A	35
Hospice																
2021 and 2022	N/A	N/A	N/A	N/A	N/A	0.182	0.132	−0.076	0.440	0.168	0.051	0.127	−0.198	0.300	0.688	82
2022 only	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.086	0.116	−0.141	0.313	0.457	417

SOURCE: RAND analysis of CMS and other data.
NOTE: Est. = estimate; LB = lower bound; UB = upper bound; SE = standard error. N/A indicates outcome was not assessed.

Summary of Difference-in-Differences Model Results

Table I.3. summarizes the results from Tables I.2 and I.3 by calendar year and year of implementation for VBID General and Hospice Benefit component.

Table I.3. Estimated Association Between Participation in VBID General or Hospice Benefit Component and the Logarithm of Plan Enrollment

Effect	Estimate	Standard Error	95% CI Lower Bound	95% CI Upper Bound	*p*-value	ESS
Year						
VBID General						
2020	0.045	0.052	−0.057	0.147	0.386	502
2021	0.069	0.048	−0.024	0.163	0.147	943
2022	−0.021	0.043	−0.106	0.064	0.626	1,758
Hospice						
2021	0.182	0.132	−0.076	0.440	0.168	82
2022	0.069	0.086	−0.100	0.238	0.424	499
Year of implementation						
VBID General						
1	−0.020	0.039	−0.095	0.056	0.609	1,863
2	0.031	0.051	−0.069	0.132	0.542	961
3	0.220	0.098	0.027	0.413	0.025	379
Hospice						
1	0.132	0.084	−0.032	0.297	0.115	499
2	0.051	0.127	−0.198	0.300	0.688	82

SOURCE: RAND analysis of CMS and other data.

Appendix J. Quality, Risk Scores, and Health Status Analysis

This appendix describes the methods used to analyze the quality, risk score, and health status outcome measures presented in Chapter 5. The general DD methodology was described in Appendix C.

Analytic Considerations

Contract-Level Measure Descriptions

We analyzed quality and health-related outcomes at both the contract and beneficiary level. The main contract-level measure that we considered was the **MA and PDP Star Rating**. This outcome is designed to capture the quality of care provided to beneficiaries through MA and Part D plans in several domains, including receipt of preventive services, managing chronic conditions, beneficiary experience, complaints and changes in health plan performance, health plan customer service, and drug safety. The number of stars that a contract (and hence the plans in that contract) can receive ranges from 1 to 5. The Star Ratings are posted to the Medicare Plan Finder annually to assist beneficiaries in selecting high-quality plans during open enrollment. Star ratings also affect payments to plans. Plans receive an MA rebate as a portion of the difference between their MA bid and the service area benchmark. Plans with higher quality scores keep more of the difference as a rebate, which must be used to provide beneficiaries with additional benefits (including the Cash Rebates option offered through the model test) or to lower their Part B, MA, or Part D premium. Star Ratings are a contract-level measure.

For our main MA and PDP Star Ratings analyses, we included all contracts with at least one VBID-participating plan as part of the treatment group. However, contracts contributing more VBID beneficiaries to the model test may be expected to have more change in their contract-level quality measures than other contracts. To address this issue, we re-estimated the overall Star Rating outcome model with three additional indicators reflecting that at least 25%, 50%, or 75% of contract enrollees were in a plan that participated in the model test.

The overall MA and PDP Star Rating is made up of five domains for the MA rating, and four domains for the Part D rating. We analyzed all five domains from the MA rating and the drug safety domain from the Part D rating because some plans implemented interventions that were designed to improve drug adherence. Analyzing the domains helps to understand whether VBID participation affected certain domains of the overall MA and PDP Star Rating more than others.

- MA
  - **Domain 1—Staying Healthy: Screenings, Tests, and Vaccines**: Many POs offered RI interventions for receipt of preventative services such as cancer screenings and flu vaccines.
  - **Domain 2—Managing Chronic (Long-Term) Conditions**: Some POs offered VBID Flexibilities interventions with lower cost sharing for physician visits, participation requirements or RI programs for disease or care management, or such supplemental benefits as bathroom grab bars that may have influenced the measures in this domain, such as controlling blood sugar for diabetics or reducing the risk of falling.
  - **Domain 3—Member Experience with Health Plan**: Getting needed care and care management are two of the measures in this domain.
  - **Domain 4—Member Complaints and Changes in the Health Plan's Performance**: Interventions, such as the Cash Rebates or healthy food card benefits, may have reduced complaints about the health plan or members leaving the health plan.
  - **Domain 5—Health Plan Customer Service**: The VBID Model test required POs to comply with additional monitoring and compliance requests from the Innovation Center as part of their participation in the model test, so the measures in this domain, such as timely appeals decisions, may have been affected by participation in the model test rather than the interventions themselves.
- Part D
  - **Domain 4—Drug Safety and Accuracy of Drug Pricing**: a number of interventions reduced cost sharing for prescription drugs (either all generics or all drugs for low-income beneficiaries or for specific classes for beneficiaries with chronic diseases) so the adherence measures included in this domain may be influenced by these interventions.

We also analyzed several contract-level quality measures that feed into specific domains that make up the overall MA and PDP Star Rating, focusing on measures of prevention and adherence that were broadly related to VBID General. These measures, which are measured on a scale of 0% to 100%, included:

- **Breast cancer screening**, a measure from the Healthcare Effectiveness Data and Information Set (HEDIS) that is defined as the percentage of female beneficiaries in the contract, aged 52–74, who had a mammogram during the past two years.
- **Colorectal cancer screening,** a HEDIS measure that is defined as the percentage of beneficiaries, aged 50–75, who were screened for colorectal cancer.
- **Yearly influenza vaccine**, defined as the percentage of beneficiaries who self-reported getting a flu shot on the MA and PDP CAHPS survey.
- **Diabetes care—blood sugar controlled** is a HEDIS measure of blood sugar control, defined as 100 minus the percentage of beneficiaries with diabetes aged 18–75 whose most recent hemoglobin A1c (HbA1c) lab test level was greater than 9% or who did not have a HbA1c in the last year.

- **Drug adherence for noninsulin diabetes medications, hypertension medications, and statins**, measured as the percentage of beneficiaries with at least two fills of the medication in the class in the calendar year who have the specific medication available for at least 80% of the days in the year.

Beneficiary-Level Measure Descriptions

We also analyzed several beneficiary-level measures related to adherence, prevention, and health outcomes. These included:

- **Breast cancer screening**, a binary variable available for women ages 52 to 74 who are identified as being due for a mammogram in a given year and who received a mammogram.
- **Drug adherence measures for noninsulin diabetes medication, hypertension medication, and statins**, in which beneficiaries considered adherent receive a 1 (having medication on hand at least 80% of the time) and a 0 if they are below 80%.
- **Risk score**, which is a measure of predicted spending based on diagnoses. Beneficiaries with average predicted spending are given a score of one, while lower-cost beneficiaries receive a score below one and higher-cost beneficiaries receive a score above one.
- **Physical component summary (PCS) and medical component summary (MCS)**, validated measures that use self-reports of physical and mental well-being, are calculated from the Veteran's RAND 12-item Health Survey (VR-12). Higher scores are better for both measures, representing very few physical limitations or high emotional well-being.
- **Activities of daily living (ADLs)**, which capture difficulty with bathing, dressing, eating, getting in or out of chairs, walking, and using the toilet, and **Instrumental Activities of Daily Living (IADLs)** which capture whether a person has difficulty preparing meals, managing money, or taking medications as prescribed. The responses to these questions were summed together to create a composite ADL or IADL score. Each item has three levels: no difficulty, some difficulty, and unable to do the activity. The total value of the ADL composite score can range from 6 (no difficulty with the tasks) to 18 (maximum difficulty with the tasks). The composite IADL score can range from 3 to 9. Higher scores indicate more difficulties with these tasks.

The PCS, MCS, ADL, and IADL measures come from the Health Outcomes Survey (HOS), which has an overlapping panel design in which a new sample is drawn from eligible MA plans every year. Sampled beneficiaries are given the opportunity to respond again two years later. As a result, not all beneficiaries have HOS data, and each year of data has a mix of returning and newly sampled beneficiaries. We restrict our analysis to beneficiaries who responded to the HOS survey in Cohort 20 in both 2018 and 2020 who were also in the stable cohort of beneficiaries enrolled in the same plan from January 1, 2019, through January 1, 2020. This meant that the sample size was smaller for this analysis than for others. We were also not able to assess parallel trends in the pre-VBID period with only one year of pre-period data.

Data Limitations for Quality Analyses

Because of the COVID-19 pandemic, several data sources for our quality analyses had gaps in data collection. The Star Ratings, our primary source for MA quality data, were also affected by several methodological changes that CMS made to ease the burden of the pandemic on MA plans. Taken together, these changes meant that the overall Star Ratings were not a reliable measure for analyzing the impact of the model test on quality of care for all VBID implementation years.

Table J.1 shows the available **measurement** years for the following datasets from which Star measures are derived:[5] CAHPS, HEDIS, HOS, and PDE. Data from 2019 were not collected for HEDIS, and 2020 data were not collected for CAHPS.

Table J.1. Available Measurement Years for Subcomponents of Star Ratings

Data Source	2017	2018	2019	2020	2021
CAHPS	X	X	X	—	X
HEDIS	X	X	—	X	X
HOS	X	X	X	X[a]	X
PDE	X	X	X	X	X

NOTE: — = Data not collected in this year.
[a] HOS collected data later than normal in 2020.

Beyond missing years of data for some datasets, several methodologic changes were made to reduce administrative burden on POs during the pandemic. First, for Star Rating display year 2021 (measurement year 2019 for HEDIS and 2020 for CAHPS), CMS used prior year data for the Star Ratings calculations for HEDIS and CAHPS measures (Center for Medicare, Centers for Medicare & Medicaid Services, 2020). Measure-level stars for HEDIS and CAHPS were also carried forward. Additionally, two HOS measures were excluded from use for the Star Rating display year 2022 (measurement year 2020) because of concerns over the validity of these measures during the pandemic: improving and maintaining physical activity and improving and maintaining mental health (Chavez-Valdez, 2021). As a result of these changes, the Star Rating for 2021 does not necessarily reflect the performance of a contract for that time period.

The third methodological change was to apply disaster adjustments to the measure-level Star Ratings given the COVID-19 public health emergency for Star Rating Year 2022 (**measurement year 2020**) (Centers for Medicare & Medicaid Services, 2021a). This meant that if the Star

[5] The measurement years differ from the display years for Star Ratings by one or two years, depending on the data source, to reflect the most-current data available at the time that each display year is calculated. For example, display year 2022 includes data from the 2021 and 2020 measurement years. For simplicity and consistency with CMS nomenclature, when we refer to measurement year, this will be the earliest year of data that contributes to the Star Rating (for example, measurement year 2020 for display year 2022).

Rating for 2022 (measurement year 2020) was lower than the previous year's rating, then CMS would revert to the previous year's Star Rating. For all of the contract-level outcomes we analyzed, we used the raw measure scores before a disaster adjustment was applied at the contract-level to calculate the Star Rating.

Outcomes and Years of Analysis

Given these data quality concerns, we adjusted our analytic strategy to focus on years of data that were least affected by pandemic-related adjustments (Table J.2).

Table J.2. Summary of Outcome Measures, Data Sources and Years Used in Quality Analyses, by Research Question

Outcome Measure	Data Source	Unit of Analysis	Measurement Years
Star Rating	Star Rating	Contract	2017–2018 versus 2021
Screening and prevention measures • Breast cancer screening • Colorectal cancer screening • Yearly flu vaccine • Diabetes care—blood sugar controlled • Medication adherence for noninsulin diabetes medications • Medication adherence for hypertension (RAS antagonists) • Medication adherence for cholesterol (statins)	HEDIS, CAHPS, PDE	Contract, beneficiary (where available)	2017-–021 for contract (missing 2019 for HEDIS and 2020 for CAHPS) 2017–2021 (PDE)
Health outcomes measures • PCS • MCS • ADLs • IADLs • Final HCC score	HOS, HCC data	Beneficiary	2018 and 2020 (HOS); 2017–2020 (HCC data)

NOTE: RAS = renin-angiotensin-system.

Results

This section describes full regression results for outcomes in Chapter 5 as well as additional outcomes not presented in that chapter (the measures for preventive and chronic condition care), and the Hospice outcomes mentioned in Chapter 11.

Health Plan Quality

Star Ratings for Contracts with VBID General and Hospice Participants

Table J.3 shows the estimate of VBID General interventions on contract-level Star Ratings for the main analysis of at least one VBID-participating plan in the contract (also presented in Chapter 5). Table J.3 also shows the sensitivity analyses in which the treatment group is limited to contracts in which at least 25%, 50%, or 75% of beneficiaries were exposed to a VBID General intervention. All contracts participating in VBID General, regardless of the level of exposure to VBID General interventions, had statistically significant increases in Star Ratings compared with comparison contracts, but we found no evidence of a dose-response relationship. We count all beneficiaries in a plan participating in VBID General as being exposed to the model, regardless of whether those beneficiaries were eligible for VBID General or used VBID General benefits, which could explain the lack of a dose-response relationship. In addition, we calculated new weights for each regression, so the comparison group is different in each analysis. For the 75% regression, we had trouble achieving reasonable balance given the relatively small number of contracts in this category.

Table J.3. Estimated Association Between VBID General Interventions and Contract Star Ratings, 2021

Participation Level	Coefficient	Standard Error	*p*-value	95% CI Lower Bound	95% CI Upper Bound	ESS
At least one VBID General plan in contract	0.31	0.03	<0.001	0.24	0.38	1,022.98
25%	0.29	0.04	<0.001	0.21	0.37	981.41
50%	0.26	0.04	<0.001	0.19	0.34	642.28
75%	0.24	0.04	<0.001	0.16	0.33	550.31

SOURCE: RAND analysis of Star Ratings data from 2017, 2018, and 2021.
NOTE: Results are derived from DD models comparing contracts with at least one plan participating in VBID General with a weighted sample of comparison contracts.

We conducted a similar analysis for contracts with at least one plan that participated in the Hospice component. Hospice Benefit component implementation was association with a decline in Star Ratings (Table J.4), but these results were marginally significant and very close to the cutoff for being statistically insignificant ($p = 0.099$). Given the limitations of the hospice analysis related to the difficulty in finding a suitable comparison group, we do not discuss these results in the main text.

Table J.4. Estimated Association Between Hospice Benefit Component Interventions and Contract Star Ratings, 2021

Participation Level	Coefficient	Standard Error	*p*-value	95% CI Lower Bound	95% CI Upper Bound	ESS
At least one Hospice plan in contract	−0.11	0.07	0.099	-0.25	0.02	203.93

SOURCE: RAND analysis of Star Ratings data from 2017, 2018, and 2021.
NOTE: Results are derived from DD models comparing contracts with at least one Hospice-participating plan with a weighted sample of comparison contracts.

Contract-Level Star Rating Domains for VBID General

Table J.5 shows the results of the impact of VBID on star domains. The staying healthy, managing chronic conditions, member experience with the plan, and customer service domains all show positive associations with VBID General, although the member experience with the plan domain was marginally statistically significant. We find no statistically significant association for the member complaints domain or the drug safety domain.

Table J.5. Estimated Association Between Hospice Benefit Component Interventions and Contract Star Ratings Domains, 2021

Star Domain	Coefficient	Standard Error	p-value	95% CI Lower Bound	95% CI Upper Bound	ESS
Part C						
Domain 1—staying healthy: screenings, tests and vaccines	0.16	0.04	<0.001	0.07	0.24	973.20
Domain 2—managing chronic (long term) conditions	0.10	0.04	0.022	0.01	0.19	1,005.66
Domain 3—member experience with health plan	0.11	0.06	0.073	−0.01	0.23	924.17
Domain 4—member complaints and changes in the health plan's performance	0.10	0.08	0.182	−0.05	0.26	926.81
Domain 5—health plan customer service	0.69	0.06	<0.001	0.57	0.81	961.69
Part D						
Domain 4—drug safety and accuracy of drug pricing	−0.04	0.05	0.415	−0.14	0.06	1,032.50

SOURCE: RAND analysis of Star Ratings data from 2017, 2018, and 2021.
NOTE: Results are derived from DD models comparing contracts with at least one plan implementing a VBID General intervention with a weighted sample of comparison contracts.

Contract-Level Quality Measures for VBID General

Table J.6 shows the impact of VBID in calendar years 2020 and 2021 at the contract level for quality measure scores related to prevention and adherence. We conducted this analysis for

VBID General only, because the conceptual link among Hospice participation, prevention, and adherence is unclear. The findings for VBID General are frequently statistically significant, and often lead to changes in the unanticipated direction. However, the effect sizes are generally very small as the outcomes are measured on a scale from 1% to 100%.

Given the number of measures contributing to each domain and the overall Star Rating, it may not be surprising that some of the individual measure scores do not go in the same direction as the domain or overall Star Rating. Surprisingly, the drug adherence measures show a negative association and are statistically significant. It could be that impacts at the contract level were driven by aspects of VBID that affected all plan enrollees, such as the WHP requirement and the increased monitoring of plan performance rather than changes targeted to specific enrollees, such as reduced drug cost–sharing. As described in the next section, these results change and become more intuitive when we focus the analysis on targeted beneficiaries.

Table J.6. Estimated Association Between VBID General Interventions and Contract-Level Preventive and Chronic Condition Care, by Model Year

Measure	Year	Coefficient	Standard Error	*p*-value	95% CI Lower Bound	95% CI Upper Bound	ESS
Breast cancer screening	2020	0.21	0.26	0.421	−0.30	0.72	424.59
	2021	0.12	0.37	0.739	−0.61	0.85	740.96
Colorectal cancer screening	2020	−1.30	0.51	0.011	−2.30	−0.30	340.48
	2021	−0.15	0.47	0.748	−1.06	0.76	658.52
Flu vaccine	2021	−2.54	0.32	<0.001	−3.17	−1.92	804.93
Diabetes care	2020	−0.07	0.51	0.898	−1.07	0.94	412.04
	2021	0.06	0.42	0.882	−0.76	0.89	713.81
Diabetes medication adherence	2020	−0.62	0.18	<0.001	−0.97	−0.28	676.45
	2021	−0.84	0.13	<0.001	−1.10	−0.58	975.57
Hypertension medication adherence	2020	−0.6	0.13	<0.001	−0.86	−0.34	626.78
	2021	−0.81	0.11	<0.001	−1.02	−0.60	930.96
Statin medication adherence	2020	−0.66	0.22	0.003	−1.10	−0.22	614.41
	2021	−0.73	0.18	<0.001	−1.09	−0.37	917.4

SOURCE: RAND analysis of Star Ratings measure scores derived from HEDIS and CAHPS data. Years of data included depend on source data.
NOTE: Results are derived from DD models comparing contracts with at least one plan implementing a VBID General intervention with a weighted sample of comparison contracts.

Beneficiary-Level Adherence and Prevention Measures

As noted in Chapter 5, beneficiaries who were targeted for VBID General interventions experienced increases in all drug adherence and prevention measures examined at the beneficiary level. These measures include adherence to noninsulin diabetes, hypertension, and statin medications, and receipt of breast cancer screening (Table J.7). These results are in stark contrast to the contract-level findings (Table J.6), which show a negative and statistically significant relationship between VBID General implementation and several contract-level measures of drug adherence and prevention. Generally, only a subset of beneficiaries in a given contract are exposed to VBID General because not all plans in the contract participate in the model test. The effect is further diluted because typically only some beneficiaries within a participating plan are targeted for the intervention. Our results suggests that while VBID General may have led to

slight improvements in adherence for targeted beneficiaries, these effects were not substantial enough to affect contract-level adherence measures.

Table J.7. Estimated Association Between VBID General Interventions and Beneficiary-Level Adherence and Prevention Measures, 2020

Measure	Coefficient	Standard Error	*p*-value	95% CI Lower Bound	95% CI Upper Bound	ESS
Diabetes medication adherence	0.014	0.003	<0.001	0.009	0.019	108,091
Hypertension medication adherence	0.007	0.002	<0.001	0.003	0.010	200,828
Statin medication adherence	0.016	0.002	<0.001	0.013	0.020	256,391
Breast cancer screening	0.010	0.006	0.103	−0.002	0.023	85,997

SOURCE: RAND analysis of Star Ratings measure scores derived from PDE data for the years 2017–2021.
NOTE: Results are derived from DD models comparing VBID General-targeted beneficiaries with a weighted sample of comparison beneficiaries. Both VBID General and comparison beneficiaries are restricted to the stable cohort and limited to beneficiaries identified as being eligible for the drug or screening.

Beneficiary Health Status

Risk Score

Beneficiaries who were targeted for VBID General interventions experienced increases in risk scores relative to comparators in nonparticipating plans (Table J.8).

Table J.8. Estimated Association Between VBID General Interventions and Beneficiary-Level Risk Score, 2020

Measure	Coefficient	Standard Error	*p*-value	95% CI Lower Bound	95% CI Upper Bound	ESS
Beneficiary risk score	0.0747	0.003	<0.001	0.069	0.079	806,234

SOURCE: RAND analysis of risk scores derived from the HCC data for the years 2017–2020.
NOTE: Results are derived from DD models comparing VBID General-targeted beneficiaries with a weighted sample of comparison beneficiaries. Both VBID General and comparison beneficiaries are restricted to the stable cohort.

Other Health Outcomes

Table J.9 shows the estimated relationship between VBID General implementation and beneficiaries' self-reported measures of health as measured by PCS, MCS, ADLs, and IADLs, among targeted beneficiaries and matched comparators. We restricted the sample to beneficiaries

who reported health outcomes in the HOS survey both before and after VBID General implementation, resulting in substantially lower sample size than attained for other analyses.

Table J.9. Estimated Association Between VBID General Interventions and Health Status Measures, 2020

Measure	Coefficient	Standard Error	*p*-value	95% CI Lower Bound	95% CI Upper Bound	ESS
PCS	0.24	0.56	0.672	–0.85	1.32	9,607.4
MCS	–0.60	0.58	0.302	–1.75	0.54	9,723.5
ADL	0.05	0.10	0.658	–0.16	0.25	9,514.4
IADL	–0.02	0.06	0.679	–0.14	0.09	9,283.6

SOURCE: RAND analysis of self-reported health status measures derived from the HOS data for the years 2018 and 2020.
NOTES: Results are derived from DD models comparing VBID General-targeted beneficiaries with a weighted sample of comparison beneficiaries. Both VBID General and comparison beneficiaries are restricted to the stable cohort, and limited to beneficiaries with repeated observations in HOS.

Appendix K. Use of High-Intensity Services Analysis

In this section, we discuss how we analyzed the relationship between VBID General and high-intensity services (hospital inpatient and emergency department use) presented in Chapter 6. Because we use MA encounter data to analyze these outcomes, we start by describing steps we took to validate these data for completeness and accuracy. We then turn to the results.

Analytic Considerations

Validation of MA Encounter Data for Measuring VBID Impacts of Utilization

Our analysis of health care utilization changes associated with VBID relies on MA Encounter Data, which are the only comprehensive detailed beneficiary-level data on health care utilization across all MA. Unfortunately, concerns have been raised about the completeness of the encounter data and its suitability as a data source for research. For example, recent independent evaluations of encounter data completeness have found that, for most contracts, inpatient and ED utilization rates derived from the encounter data deviate substantially from rates derived from other data sources, such as HEDIS or MEDPAR (Jung, Carlin, and Feldman, 2022; Medicare Payment Advisory Commission [MedPAC], 2019) .

However, the implications of these findings about encounter data quality for our study are uncertain for two main reasons. First, existing evaluations of encounter data completeness focus on years prior to those examined in this evaluation report. We use encounter data from the 2017 through 2020 service years, whereas other published evaluations of encounter data quality focus on 2015 or older data (Jung, Carlin, and Feldman, 2022; MedPAC, 2019). Second, and more importantly, the existing validation studies address dimensions of data quality that are not critical for the internal validity of our study: in particular, encounter data validation efforts have often been conducted in support of comparison between utilization rates in MA and FFS. This objective imposes much stronger requirements on data quality than we need the encounter data to meet in our evaluation.

Specifically, our DD research design uses a comparison group of MA plans and focuses on within-plan changes in outcomes, so certain forms of incompleteness or inaccuracy in the encounter data that would prevent valid comparisons with FFS can be controlled for by our DD design. We are not aware of published validation exercises that have addressed the narrower question of whether the encounter data are sufficiently accurate to use in an DD research design that compares changes within MA plans over time.

To examine the dimensions of encounter data quality that are most critical to our DD evaluation design, we conducted a validation exercise that focused on within-plan changes

between 2017 and 2020 in utilization rates derived from encounter data. Specifically, to evaluate the potential for changes in encounter data reporting to be confounded with VBID, we tested whether there is evidence suggesting that encounter data reporting changed differentially for VBID plans in 2020. Our findings suggest that reporting of inpatient stays was not associated with VBID implementation, but that reporting of ED visits in VBID plans may have changed in ways likely to be confounded with VBID. We describe our validation methods and findings from this validation exercise in more detail in the following section before describing an approach to causal inference that we use to guard against confounding VBID implementation effects with concurrent changes in encounter data reporting.

Validation Dataset Construction Using Encounter Data and Plan Bids

Any attempt to validate utilization rates derived from encounter data requires an independent data source with utilization rates that can serve as a benchmark or validation target. As noted previously, previous validation exercises have compared the encounter data with utilization rates derived from MEDPAR and HEDIS. We used a previously unexamined data source as a validation target: base period experience submitted to the CMS OACT in the BPT workbook.

Extracting Utilization Rates from Plan Bid Data

Plan bids include data on base period utilization, cost sharing, and net medical spending across several service categories. The *base period* is defined as the year two years prior to the contract year of the bid. For example, 2022 plan bids contain base period data for 2020. If a plan existed in the base period and had a sufficient number of beneficiaries to allow credible estimates of utilization rates, POs are instructed to report base period utilization for that plan. The importance of accurate bid data for plans' financial outcomes provides incentives for plans to report accurate utilization rates, making the bid data a reasonable validation target for utilization measures derived from the encounter (ENC) data.

We restricted attention to unsegmented plans for which base period experience was not averaged together with any other plans, eliminating ambiguity in linking the BPT-based rates to ENC data-based rates for the same plans. Plans appearing in the BPT data provided to RAND more than once in the same year were excluded to avoid the complication of resolving differences in reported utilization rates. Furthermore, we excluded from our analysis plans that reported base period utilization rates in units other than the most commonly used unit for each service category. This restriction was necessary because plans can choose the units in which they report base period utilization rates. For example, while most plans report inpatient utilization in terms of "days," some plans instead report inpatient utilization in terms of "admits" or "benefit period."

Within the sample of plans that we use in our analysis, inpatient utilization is measured as the number of inpatient days per 1,000 beneficiaries and ED utilization is measured as the number of visits per 1,000 beneficiaries. All per-beneficiary rates in the BPT are annualized.

Calculating Utilization Rates from the Encounter Data

To validate utilization rates calculated in the ENC data (*ENC-based rates*) against rates reported in the bid data (*BPT-based rates*), we began by calculating inpatient and ED utilization rates in each year from 2017 to 2020 from the ENC data in the IDR, counting utilization in units comparable with those in the BPT data described previously.

To construct utilization rates from the encounter data, we used an algorithm previously developed by RAND for CMS. The algorithm identifies final ENC data records, excluding chart review records and ENC data records that have been updated. RAND's algorithm has additional logic to de-duplicate final action records, including records for inpatient stays with overlapping service dates. To calculate utilization counts that could be used as numerators to derive utilization rates, we de-duplicated based on service category (inpatient, ED), date of service, and organizational National Provider Identifier (ORG_NPI).

In addition to de-duplicating records within service category, we removed ED visits with dates occurring during an inpatient stay. These edits were intended to approximate rules that might be commonly used by plans in calculating utilization rates for the BPT. As we discuss in the "Limitations" section, actuarial consultants informed us that plans are likely to map utilization records from their internal claim systems to service categories based on the cost sharing that a patient is likely to face. Our edits are motivated by the assumption that an ED visit that leads to inpatient admission might face inpatient cost-sharing rules. As we discuss in the following section, plans are likely to vary in their approaches to calculating utilization rates for the BPT, so our ENC data-based utilization rates are at best an approximation to the methods that plans are believed to use in many cases.

For ED care, we counted de-duplicated bill lines as unique visits. For inpatient care, we calculated the number of days after using the more complex de-duplication logic in the RAND algorithm. Rates of inpatient days and ED visits per 12,000 member-months (1,000 annualized beneficiaries) were then calculated using counts of enrolled member-months calculated in the IDR.

Linking Utilization Rates from the Bid Data to the Encounter Data

Plans with base period data in the BPT were linked to the ENC data-based rates on the basis of contract ID, plan ID, and year. (*Year* was defined as the base period in the BPT and defined as the service year in the encounter data.) As noted previously, segmented plans and plans that appeared more than once in the BPT base period data were excluded.

Base period data were not available for all VBID and comparison plans for several reasons. Rates for new plans may be developed using manual rating or other approaches, and base period experience can be averaged together across multiple segments or multiple plans when plans or segments had a small number of beneficiaries in the base period. We also note that plans may be

used to calculate base period experience for multiple bids, and therefore may appear multiple times in the BPT data provided to RAND.

Table K.1 reports the step-by-step impact of our sample criteria on the number of plan-year observations available for our analysis. The table also reports the number of member-months corresponding to each row.

Table K.1. Sample Construction for Linked BPT-Based and ENC Data-Based Utilization Rates

	Plan-Years	Plan-Years	Member-Months	Member-Months
Sample Definition	***N***	**% of First Row**	***N***	**% of First Row**
All VBID, comparison plans with 2017–2020 base period rates reported in bid	11,190	100.0%	766,513,877	100.0%
Excluding base period segments plans appearing in bids with two-plus base period plans	9,643	86.2%	688,692,036	89.9%
Excluding base period plans that are segmented	9,135	81.6%	617,171,586	80.5%
Excluding unsegmented base period plans appearing in two-plus bids	9,114	81.5%	611,533,585	79.8%
Excluding base period plans that fail to match to ENC data-based rates	8,193	73.2%	611,173,573	79.7%
Excluding plans with rates not reported in typical units				
Inpatient	7,228	64.6%	526,284,746	68.7%
ED	7,841	70.1%	604,505,420	78.9%
Exclude outliers				
Inpatient	7,198	64.3%	525,951,184	68.6%
ED	7,838	70.0%	604,482,432	78.9%
Exclude plans with low enrollment				
Inpatient	3,492	31.2%	482,392,259	62.9%
ED	3,860	34.5%	558,103,480	72.8%

SOURCE: RAND analysis of 2017–2020 CMS BPT and ENC data.
NOTE: Plan-year = unique contract ID-plan ID-year observations. Member-months = total number of member-months corresponding to plans included in row.

Out of 11,190 plan-year observations with 2017–2020 utilization rates reported as base period experience for either VBID or comparison plans, 9,114 remained after excluding segmented plans and plans that either appeared as base period experience in multiple bids or that were averaged together with other plans in reporting base period experience. Of these, 8,193 were linked to ENC-based rates. In most cases, plans without ENC-based rates were excluded because of very low enrollment: Although about 10% of plans were not linked, less than 0.1% of member-months were excluded at this step. (In some cases, failure to link the BPT data to ENC-

based rates was driven by the fact that we calculated ENC-based rates only for VBID or comparison plans (or, in earlier years, plans that were crosswalked to those plans).

Continuing down the table, we report the number of plans remaining after imposing restrictions using the units in which utilization was reported in the BPT. Inpatient utilization was more likely than ED utilization to be reported in units other than the most commonly reported (or *typical*) utilization type. The proportion of member-months retained after excluding plans with atypical utilization types was 86% for inpatient care and 99% for ED care.

Finally, the bottom two panels of Table K.1 show the impact of excluding plans that were outliers in terms of the percentage difference between the ENC-based rate and the BPT-based rate, and of excluding plans with low enrollment. Exclusion of outliers has essentially no impact (less than 0.1% of plans or member-months) on the sample of plans available. We also excluded *small plans*, which we defined as plans with 2,500 or fewer annualized members (or 30,000 member-months). This threshold was used by Jung, Carlin, and Feldman (2022) to identify contracts likely to have noisy utilization rates because of low enrollment. Excluding small plans reduces the number of plan-year observations dramatically but removes only 5.7% of member-months for inpatient care and 6.1% of member-months for ED care.

We use a final sample containing 3,492 plan-year observations for inpatient care and 3,860 plan-year observations for ED care. Regression analyses are weighted by plan enrollment unless otherwise noted. We used weighted least squares regression because utilization rates are estimated more precisely for larger plans.

Encounter Data Validation Methods

To validate the ENC-based utilization rates against BPT-based utilization rates, we assume that the BPT-based rates are accurate and thus can be used as an informative validation target. Our analysis begins with a comparison of the average utilization rate (averaged across all plan-year observations) reported in the BPT that derived from ENC data. We also report, in the spirit of the contract-level analysis in (Jung, Carlinm and Feldman, 2022), the proportion of plans that have ENC-based rates within 10% of the BPT-based rate.

However, as noted previously, our DD design does not require ENC-based rates to accurately capture the level of utilization as long as reporting differences between ENC-based rates and true utilization rates are due to permanent plan-level differences and changes affecting all plans at the same time. In this case, plan and year fixed effects can control for encounter reporting, allowing us to estimate the effect of VBID without bias.

Because health care utilization is typically modeled using an exponential conditional mean function, we applied a logarithmic transformation to the plan-level utilization rates. That is, we analyzed:

$$\text{Log reporting difference}_{pt} := ln(\text{ENC}_{pt}) - ln(\text{BPT}_{pt}) \qquad \text{(Equation K.1)}$$

where ENC_{pt} is the ENC-based utilization rate for plan *p* in year *t*, and BPT_{pt} is the BPT-based utilization rate for plan *p* in year *t*. The log reporting difference reflects (approximately) the percentage difference between the ENC-based rate and the BPT-based rate. For example, a log reporting difference of 0.01 indicates that the ENC-based rate for a plan is approximately 1% higher than the BPT-based rate for that plan.

We also examine a plan-level measure of the difference between the ENC utilization rates and BPT utilization rates as a percentage of the BPT utilization rate, which we term the *ED percentage difference*:

$$\text{ENC percentage difference}_{pt} = (\text{ENC}_{pt} - \text{BPT}_{pt})/\text{BPT}_{pt} \qquad \text{(Equation K.2)}$$

where ENC_{pt} is the ENC-based utilization rate for plan *p* in year *t*, and BPT_{pt} is the BPT-based utilization rate for plan *p* in year *t*.

We can then use these measures of the difference in reported utilization rates to estimate a DD regression model that tests whether reporting differences between the ENC-based utilization rates and BPT-based utilization rates changed in ways that were associated with VBID implementation. This exercise is motivated by the following thought experiment: Under the assumption that BPT rates reflect the true utilization rates of interest, we would wish to estimate the following DD model for VBID impacts:

$$\text{BPT}_{pt} = \pi_p + \mu_t + \tau\text{VBID}_{pt} + \varepsilon_{pt} \quad \text{(Equation K.3).}$$

By adding the difference (ENC_{pt}-BPT_{pt}) to both sides, we obtain:

$$\text{BPT}_{pt} + \text{ENC}_{pt} - \text{BPT}_{pt} = \pi_p + \mu_t + \tau\text{VBID}_{pt} + (\varepsilon_{pt} + \text{ENC}_{pt} - \text{BPT}_{pt}) \text{ (Equation K.4)}$$

which can be rewritten as:

$$\text{ENC}_{pt} = \pi_p + \mu_t + \tau\text{VBID}_{pt} + \eta_{pt} \text{ (Equation K.5)}$$

where the new error term η_{pt} is equal to the original error term ε_{pt} plus the difference ($\text{ENC}_{pt} - \text{BPT}_{pt}$) between ENC-based and BPT-based rates. Because the original error term ε_{pt} is uncorrelated with the explanatory variables by definition, ordinary least squares estimation of this regression model will be unbiased for τ (the effect of VBID on the true utilization rate) if ($\text{ENC}_{pt} - \text{BPT}_{pt}$) is uncorrelated with VBID_{pt} after controlling for plan and time fixed effects (π_p and μ_t).

To test whether ($\text{ENC}_{pt} - \text{BPT}_{pt}$) satisfies this condition, we can estimate a DD regression model that can be written as follows:

$$\mathrm{ENC}_{pt} - \mathrm{BPT}_{pt} = \pi_p + \mu_t + \tau \mathrm{VBID}_{pt} + \eta_{pt} \qquad \text{(Equation K.6).}$$

The coefficient τ from this model allows us to test whether the difference between ENC-based and BPT-based rates is changing in a way that is correlated with VBID implementation.[6]

Limitations

We worked with actuarial consultants to understand how base period experience reported in the BPT is determined by the plans, what incentives plans face for reporting accurate utilization rates in the BPT, and whether there are issues that might affect those rates' comparability to ENC-based rates or other utilization measures. Briefly, accuracy of the base period utilization rates is very important for plans because rates reported in the BPT have implications for unit costs, member cost-sharing, net medical spending per-member per-month, and, ultimately, the MA bid. Base period data are also subject to frequent audits.

However, the actuarial consultants also pointed out some subtleties that could make BPT-based rates difficult to compare with utilization rates derived for other purposes. Because the ultimate purpose of the base period utilization data reported in the BPT is to calculate net medical spending and support the MA bid, the algorithms used by plans to calculate utilization counts (the numerator for BPT-based rates) from plans' internal records should generally be driven by plans' cost-sharing structures. This could lead to differences across plans in how service categories are defined, with plans taking potentially different approaches to assigning bill lines or other encounter records to service categories or to de-duplicating records when different types of services are provided on the same day or during the same episode of care. This creates substantial potential for unobserved heterogeneity across plans in how services are mapped from claim files to service categories used in the BPT, and in how services are de-duplicated within and across categories. It was not feasible within the scope of our analysis to develop a method for incorporating these plan-level differences into our calculation of ENC-based utilization rates.

Encounter Data Validation Results

Table K.2 compares ENC-based rates with BPT-based rates, averaging across all plans. Note that this table includes plans that are outliers and small plans. Compared with BPT-based rates, ENC-based rates averaged over 2017–2020 were 17% higher for inpatient days and 3% lower for ED visits.

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[6] Equations 6 and 8 are presented with BPT_{pt} and ED_{pt} in levels for ease of exposition. The same argument applies if utilization rates are log-transformed. For consistency with other analyses in this memo, we report estimates of Equation K.8 with log-transformed utilization rates.

Table K.2. Mean ENC-Based and BPT-Based Utilization Rates, by Service Category

Service Category (Units)	Mean BPT Utilization Rates	Mean ENC Utilization Rates	Difference in Means (ENC – BPT)	% Difference (ENC – BPT)/ BPT	Number of Plan-Year Observations
Inpatient (Days)	1,250	1,463	214	17.1%	7,255
ED (Visits)	603	583	−21	−3.4%	7,851

SOURCE: RAND analysis of 2017–2020 CMS BPT and ENC data.
NOTE: Estimates weighted by plan enrollment.

Previous validation analyses, especially those focusing on inpatient utilization, have highlighted the incompleteness of ENC data. It therefore may seem surprising that we find higher inpatient utilization rates in the ENC data. It is possible that differences between the methods that plans use to calculate utilization rates for the BPT and those we applied to calculate ENC-based utilization rates contribute to some of these differences.

Table K.3 presents the proportion of plans (weighted by enrollment) that have ENC-based utilization rates within 10% of the BPT-based utilization rate. We found that fewer than 30% of enrollees between 2017 and 2020 belonged to plan-year observations with an ENC data percentage difference below 10% for either inpatient or ED care. These results are qualitatively similar to recently published findings by (Jung, Carlin, and Feldman, 2022).

Table K.3. Share of Member-Months in Plans with ENC Versus BPT Percentage Difference Below 10 Percent

Year	Inpatient (Days)	ED (Visits)
2017	15.5%	40.6%
2018	17.2%	30.2%
2019	10.3%	28.0%
2020	19.4%	26.5%
All Years	15.7%	31.0%

SOURCE: RAND analysis of 2017–2020 CMS BPT and ENC data.

The year-by-year results in Table K.3 also offer some insight into whether the accuracy of ENC-based rates has been improving over time. Some improvement between 2017 and 2020 is apparent for inpatient care, but the proportion of plans in which the ENC-based rate is close to the BPT-based rate does not appear to improve over time for ED care.

Is VBID Likely to Be Confounded with Changes in Encounter Data Reporting?

DD regression estimates of the association between the ENC data percentage difference and VBID implementation yield mixed findings depending on service category.[7] For inpatient days, the association between VBID implementation and the ENC versus BPT percentage difference is estimated to be small and statistically insignificant (Table K.4). However, we find statistically significant associations between VBID implementation and changes in the ENC versus BPT percentage differences for ED visits. Models that use the difference between ENC-based and BPT-based log utilization rates as the outcome yield qualitatively similar findings, suggesting that the difference between ENC- and BPT-based utilization rates for ED care increased in 2020 for VBID plans.

Table K.4. Estimated Association Between VBID General Interventions and ENC Versus BPT Percentage Difference by Service Category, 2020

Service Category	Log Reporting Difference (ENC-BPT)	Percentage Difference (ENC-BPT)
Inpatient	−0.001	−0.009
	−0.013	−0.014
ED	0.071***	0.058***
	−0.017	−0.016

SOURCE: RAND analysis of 2017–2020 ENC and OACT bid data.
NOTE: ***, **, and * represent statistical significance at the 0.1%, 1%, and 5% levels, respectively, from the DD models comparing VBID-participating plans with a weighted sample of comparison plans. Standard errors clustered on contract are in parentheses. This table reports coefficients from a weighted least squares regression of the ED percentage difference on plan fixed effects, year fixed effects, and an indicator for VBID implementation in 2020 (equal to one in 2020 for plans participating in VBID, and equal to zero otherwise). Regressions are weighted by enrollment (measured in member-months).

The coefficient on VBID in the log difference model for ED reporting indicates that VBID was associated with an approximately 7.3% increase (95% CI: 3.8% to 10.9%) in the difference between the ENC-based utilization rate and the BPT-based utilization rate. The coefficient on VBID in the percent difference model indicates that VBID was associated with a 5.8% increase (95% CI: 2.8% to 8.9%) in the difference between the ENC-based utilization rate and the BPT-based utilization rate.

These results suggest that VBID could be confounded with changes in reporting. We therefore conducted sensitivity analyses that model ED utilization changes of the magnitude suggested by Table K.3 as a violation of the parallel trends assumption.

[7] We included all plans participating in VBID in 2020 or 2021 in the treatment group in the analysis, so this regression model tells us whether plans participating in VBID in either 2020 or 2021 had a change in the ED percentage difference in 2020.

Analyzing Robustness of VBID Utilization Impacts to Changes in Encounter Data Reporting

To conduct inference on the causal effects of VBID General implementation on ED utilization while accounting for the changes in ED reporting suggested by our validation analysis, we use methods for DD estimation under parallel trends violations (Rambachan and Roth, 2023). Briefly, we model ED reporting changes as a parallel trends violation and apply the methods proposed by Rambachan and Roth (2023) to calculate 95% CIs for the VBID General treatment effect that are robust to parallel trends violations of the magnitude and direction suggested by the validation analysis described previously.[8]

Rambachan and Roth analyze DD research designs with *parallel trends violations*, meaning differential changes in the counterfactual outcome associated with treatment during the post-treatment period. They provide CIs that remain valid under a wide range of parallel trends violations. To apply the Rambachan and Roth method to our situation (with a differential change in ENC data reporting at the same time as VBID implementation), we use the results of our validation analysis to define assumptions about the potential range of parallel trends violations that we think may have occurred.

Specifically, we interpret the validation results as an estimate of the differential change in ENC-based utilization measures that would have occurred in VBID plans if no other factors had caused differential changes in utilization in the VBID plans. In particular, this assumption implies that differential changes in ENC data reporting would have increased the ED utilization rate for VBID plans as measured in ENC data even if VBID had not affected true utilization rates. We note that, from this perspective, it does not matter if the change in reporting is a causal effect of VBID or not: Any changes correlated with VBID that affect the utilization rate observed in ENC data, but that do not affect the true rate of utilization by beneficiaries, would represent a parallel trends violation in a DD model (such as ours) that is intended to isolate the effect of VBID on utilization.

We use the honestDiD R package to calculate 95% CIs for the effect of VBID on utilization under a range of parallel trends violations suggested by our validation exercise. We used the computeConditionalCS_DeltaSDB function provided by the honestDiD package, which defines the allowed parallel trends violations as:

1. A linear extrapolation of any differential trend estimated in the pre-intervention period (2017–2019 in our case).

[8] A 95% CI is an interval that covers the true value of the parameter 95% of the time. Given a set of event-study coefficient estimates, the confidence intervals derived by the Rambachan and Roth (2023(method will cover the true value of the average treatment effect on the treated 95% of the time under an assumed range of parallel trends violations. It is important to note that these CIs differ from Cis for more-familiar estimators (such as the difference-in-differences regression coefficients reported throughout this report) in that the probability distribution of the true parameter's location within the Rambachan and Roth CI is unknown without stronger assumptions than we are willing to make on the nature of the parallel trends violation.

2. A deviation of the counterfactual up to a specified magnitude *M* in a known direction.

Our validation analysis found statistically significant evidence that the reporting difference between ENC- and BPT-based rates increased by an additional 7% for VBID plans in 2020 over and above changes in the reporting difference observed in comparison plans. As a starting point, we therefore allow the mean utilization rate for VBID plans in the absence of VBID to deviate from the group average trend observed in the three years prior to VBID by 7%.

Results

Table K.5 shows the results of regressions that used the stable cohort of beneficiaries (that is, targeted and comparison beneficiaries who were enrolled in the same VBID General plan from January 1, 2019, through January 1, 2020) to assess the relationship between VBID General implementation and high-intensity services use. We used a Poisson regression approach to estimate these models because the outcome variables clustered around a small number of discrete values (for example, 0, 1, 2). We report exponentiated coefficients and CIs in the main report; these can be interpreted as percentage changes. (For example, the 11.9 percent increase in inpatient stays mentioned in Chapter 6 comes from exponentiating the coefficient of 0.112 and subtracting 1.) Because our inclusion criteria do not ensure that all beneficiaries have data in all pre-VBID years, we could not directly weight the beneficiary-level data to ensure parallel trends in the pre-period. Rather, we generated weights that ensured that plan-level trends in inpatient and ED use were equivalent for VBID General and comparison observations. Aside from this adjustment for parallel trends, we used the same entropy-weighting approach as described in Appendix C.

Table K.5. Estimated Association Between VBID General Participation and Use of High-Intensity Services, 2020

Outcome	Estimate	Standard Error	95% CI Lower Bound	95% CI Upper Bound	p-value	ESS
Inpatient stays	0.112	0.008	0.097	0.128	<0.001	720,131
Inpatient stays, without coronavirus	0.122	0.009	0.104	0.139	<0.001	719,389
ED visits	0.080	0.006	0.069	0.092	<0.001	719,578
ED visits, revised CIs	0.080	N/A	–0.045	0.075	N/A	719,578

SOURCE: RAND analysis of CMS and other data.
NOTE: N/A = not applicable. Results are derived from DD models comparing VBID General-targeted beneficiaries with a weighted sample of comparison beneficiaries. Both VBID General and comparison beneficiaries are restricted to the stable cohort. Coefficients must be exponentiated to get percent changes.

Table K.5 indicates that the impact of the VBID General on ED use would have been statistically significant in the naïve model without correcting for ENC data reporting issues described previously. However, when we allowed for a parallel trends violation of 7%, the ED

results were not statistically significant at conventional levels. In sensitivity analyses, we found that the results were not robust to any parallel trends violation greater than 3%, the lower bound on the CIs from the ENC data versus BPT reporting differences regressions reported in Table K.4.

Appendix L. Plan-Level Financial Outcomes

This appendix defines outcome variables used to analyze plan-level financial outcomes and presents detailed regression results supporting findings discussed in Chapters 7 and 8 (for VBID General) and Chapter 11 (for Hospice). We also present regression results for additional outcomes that we used to understand mechanisms underlying these estimated impacts of VBID.

Analytic Considerations

Variables measuring MA and Part D bids, costs of mandatory supplemental benefits, and MA and Part D bid components (which are analyzed in additional regression tables shown in this appendix) were extracted from BPT data provided to RAND by the CMS OACT. BPT comprises a series of Microsoft Excel workbooks that are used by POs to submit and justify their bids for MA and Part D coverage. BPT also contains detailed information needed to calculate premiums, such as the cost of mandatory supplemental benefits in MA, the cost of supplemental coverage in Part D, and the allocation of MA rebates to cover supplemental benefits and buydown of Part B and Part D premiums.

BPT for a given contract year are submitted during the prior calendar year; for example, 2022 bids were due to CMS by June of 2021. All variables obtained from BPT are therefore available through 2022.

Data on MA and Part D premiums analyzed in this chapter were extracted from HPMS, which provides detail on premiums before and after the MA rebate is applied to buy down amounts owed by beneficiaries (MA rebates are quality-adjusted payments made by CMS to plans with bids below a regional benchmark). These variables are also available through 2022.

Costs to CMS for MA and Part D coverage are somewhat more complex to construct; we describe the data sources and availability of these variables here.

PMPM MA Costs to CMS are derived from three variables reported in the BPT data:

$$\textit{PMPM MA Costs to CMS} = \textit{Standardized MA bid} * \textit{Projected MA risk score} + \textit{MA rebate}. \quad \text{(Equation L.1)}$$

The MA rebate is equal to zero if the bid is above the benchmark.

In this report, we define PMPM Part D Costs to CMS as the sum of three terms:

$$\textit{PMPM Part D Costs to CMS} = \textit{Direct Subsidy} + \textit{PMPM LIS} + \textit{PMPM Reinsurance} \quad \text{(Equation L.2)}$$

where *PMPM LIS* denotes low-income subsidy payments. These three terms are obtained from different data sources with different availability, which we discuss in turn.

The direct subsidy, which is part of the monthly capitation payment provided to a plan for providing the basic Part D benefit, is defined as

$$\textit{Direct subsidy} = \textit{Standardized Part D bid} * \textit{Projected Part D risk score} - \textit{beneficiary premium}. \quad \text{(Equation L.3)}$$

The base beneficiary premium is derived from the standardized plan bid and several national average amounts calculated by CMS. These national average amounts were obtained from the CMS website, while the Part D bid and the projected risk score were obtained from the BPT. These quantities are all available through 2022.

The PMPM LIS is the sum of the low-income premium subsidy (LIPS) and the low-income cost-sharing subsidy (LICS). To calculate LIPS payments, data from HPMS on the subsidized premiums for each plan were used to back out the LIPS payment at each subsidy level, and the total LIPS payment for the plan was calculated using counts of beneficiary-months at each subsidy level extracted from the IDR. LICS is calculated from the PDE data; LICS payments are reported as a field on each PDE record, so we aggregated LICS payments to the plan level.

PMPM reinsurance reflects payments from CMS to plans for plan spending in the catastrophic benefit phase. We calculated reinsurance as 80% of gross drug costs above the part d out-of-pocket threshold (GDCA). Like LICS, GDCA is reported as a field on each PDE record, and GDCA at the plan level was aggregated from the PDE data.

Because PDE data are finalized several months after the end of the plan year, 2022 LICS and reinsurance payments could not yet be calculated with sufficient reliability as of the time of writing. We therefore analyzed Part D costs to CMS only through 2021. Total costs to CMS were the sum of MA and Part D costs to CMS. We were able to analyze total costs to only CMS through 2021 as well.

Some limitations of our cost-to-CMS variables need to be noted. Our calculations of both MA and Part D costs to CMS use projected risk scores rather than final, realized risk scores. Final risk scores must be calculated from the IDR and were not finalized for 2022 at the time of writing. Part D costs also omit two important elements for which we were unable to obtain necessary data.

First, manufacturer rebates and other direct and indirect remuneration (DIR) received by plans is not factored into our Part D costs-to-CMS measure. Because a portion of DIR is shared with CMS via a reduction in the reinsurance payment, omission of DIR from our calculations means that our measure of reinsurance overestimates the final (net of DIR) reinsurance costs to CMS.

Second, we do not account for risk corridor payments, which must also be constructed using DIR data. *Risk corridor payments* are a mechanism through which plans share the risk of

unexpectedly high or low drug spending with CMS. For many years, total risk corridor payments in the Part D program were negative (meaning that the risk corridor, on net, reduced costs to CMS). However, since 2018, total risk corridor payments have been zero or positive, suggesting that our omission of risk corridor payments might lead us to underestimate costs to CMS (Boards of Trustees, Federal Hospital Insurance and Federal Supplementary Medical Insurance Trust Funds, 2022).

Because our DD research design controls for permanent differences in outcomes across plans, however, omission of DIR and risk corridor payments will not lead to bias in our estimates of changes associated with VBID unless VBID implementation was associated with differential changes in either DIR or risk corridor payments. We also note that risk corridor payments between 2017 and 2021 (the latest year of data available) comprised only about 2% of total payments to plans from CMS, suggesting that their impact on our measure of Part D costs might be limited.

A full list of plan-level financial outcome variables is presented above in Appendix D.

Group-Specific Difference-in-Differences Regression Results

Table L.1 presents the results of the VBID General DD models for MAPD bids by participation group.

Table L.1. Difference-in-Differences Model Results for VBID General: MAPD Bids

	2020	2020	2020	2020	2020	2021	2021	2021	2021	2021	2022	2022	2022	2022	2022	
Participant Group	Estimate	SE	95% CI Lower Bound	95% CI Upper Bound	*p*-value	Estimate	SE	95% CI Lower Bound	95% CI Upper Bound	*p*-value	Estimate	SE	95% CI Lower Bound	95% CI Upper Bound	*p*-value	ESS
2022 only	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	−2.75	3.26	−9.14	3.63	0.398	675.43
2021 and 2022	N/A	N/A	N/A	N/A	N/A	−4.25	3.19	−10.49	2.00	0.183	2.66	3.90	−4.99	10.31	0.495	468.53
2020, 2021, and 2022	−2.48	3.81	−9.95	4.99	0.515	−3.24	5.00	−13.03	6.56	0.517	−1.50	5.72	−12.72	9.72	0.793	716.38
2020 only	−10.46	8.85	−27.81	6.90	0.238	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	63.79
2020 and 2022	−8.65	22.74	−53.22	35.92	0.704	N/A	N/A	N/A	N/A	N/A	−47.08	29.03	−103.99	9.82	0.105	172.36
2020 and 2021	−9.78	9.39	−28.18	8.62	0.297	61.47	14.99	32.09	90.86	<0.001	N/A	N/A	N/A	N/A	N/A	14.67

SOURCE: RAND analysis of CMS and other data.
NOTE: N/A indicates outcome was not assessed.

Table L.2 presents the results of the Hospice Benefit component DD models for MAPD bids by participation group.

Table L.2. Difference-in-Differences Model Results for Hospice Benefit Component: MAPD Bids

	2021	2021	2021	2021	2021	2022	2022	2022	2022	2022	
Participant Group	Estimate	Standard Error	95% CI Lower Bound	95% CI Upper Bound	*p*-value	Estimate	Standard Error	95% CI Lower Bound	95% CI Upper Bound	*p*-value	ESS
2021 and 2022	−18.39	6.93	−31.98	−4.80	0.008	−43.03	9.33	−61.31	−24.75	<0.001	1,404.94
2022 only	N/A	N/A	N/A	N/A	N/A	−4.68	7.22	−18.83	9.47	0.517	220.36

SOURCE: RAND analysis of CMS and other data.
NOTE: N/A indicates outcome was not assessed.

Table L.3 presents the results of the VBID General DD models for total costs to CMS by participation group.

Table L.3. Difference-in-Differences Model Results for VBID General: Total Costs to CMS

Participant Group	2020 Estimate	2020 Standard Error	2020 95% CI Lower Bound	2020 95% CI Upper Bound	2020 *p*-value	2021 Estimate	2021 Standard Error	2021 95% CI Lower Bound	2021 95% CI Upper Bound	2021 *p*-value	ESS
2021 and 2022	N/A	N/A	N/A	N/A	N/A	49.26	12.44	24.88	73.63	<0.001	448.73
2020, 2021, and 2022	12.39	9.58	−6.38	31.16	0.196	32.68	12.33	8.51	56.85	0.008	547.64
2020 only	−17.95	14.04	−45.46	9.57	0.201	N/A	N/A	N/A	N/A	N/A	68.30
2020 and 2022	87.51	36.92	15.14	159.88	0.018	N/A	N/A	N/A	N/A	N/A	22.94
2020 and 2021	−1.16	24.78	−49.73	47.41	0.963	33.11	36.51	−38.44	104.66	0.364	12.79

SOURCE: RAND analysis of CMS and other data.
NOTE: N/A indicates outcome was not assessed.

Table L.4 presents the results of the Hospice Benefit component DD model for total Costs to CMS by participation group.

Table L.4. Difference-in-Differences Model Results for Hospice Benefit Component: Total Costs to CMS

Participant Group	2021 Estimate	2021 Standard Error	2021 95% CI Lower Bound	2021 95% CI Upper Bound	2021 *p*-value	ESS
2021 and 2022	−1.77	15.79	−32.73	29.19	0.911	868.15

SOURCE: RAND analysis of CMS and other data.

Table L.5 presents the results of the VBID General DD models for total premiums by participation group.

Table L.5. Difference-in-Differences Model Results for VBID General: Total Premiums

Participant Group	2020 Estimate	2020 SE	2020 95% CI Lower Bound	2020 95% CI Upper Bound	2020 *p*-value	2021 Estimate	2021 SE	2021 95% CI Lower Bound	2021 95% CI Upper Bound	2021 *p*-value	2022 Estimate	2022 SE	2022 95% CI Lower Bound	2022 95% CI Upper Bound	2022 *p*-value	ESS
2022 only	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.25	0.56	−0.86	1.35	0.664	678.82
2021 and 2022	N/A	N/A	N/A	N/A	N/A	2.70	1.06	0.62	4.78	0.011	3.08	0.91	1.29	4.86	<0.001	483.30
2020, 2021, and 2022	−1.24	1.31	−3.80	1.32	0.343	−0.77	1.59	−3.89	2.34	0.626	−1.38	1.81	−4.93	2.17	0.445	736.58
2020 only	0.94	1.63	−2.26	4.13	0.565	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	78.77
2020 and 2022	1.21	0.79	−0.34	2.77	0.125	N/A	N/A	N/A	N/A	N/A	−2.21	2.27	−6.66	2.23	0.329	198.75
2020 and 2021	4.53	6.57	−8.34	17.41	0.490	31.38	10.74	10.32	52.44	0.003	N/A	N/A	N/A	N/A	N/A	15.82

SOURCE: RAND analysis of CMS and other data.
NOTE: N/A indicates outcome was not assessed.

Table L.6 presents the results of the Hospice Benefit component DD models for total premiums by participation group.

Table L.6. Difference-in-Differences Model Results for Hospice Benefit Component: Total Premiums

Participant Group	2021 Estimate	2021 Standard Error	2021 95% CI Lower Bound	2021 95% CI Upper Bound	2021 *p*-value	2022 Estimate	2022 Standard Error	2022 95% CI Lower Bound	2022 95% CI Upper Bound	2022 *p*-value	ESS
2021 and 2022	−4.49	2.49	−9.37	0.39	0.071	−3.45	2.61	−8.56	1.67	0.187	1,341.65
2022 only	N/A	N/A	N/A	N/A	N/A	0.23	1.55	−2.80	3.27	0.880	270.68

SOURCE: RAND analysis of CMS and other data.
NOTE: N/A indicates outcome was not assessed.

Table L.7 presents the results of the VBID General DD models for the cost of mandatory supplemental benefits by participation group.

Table L.7. Difference-in-Differences Model Results for VBID General: Cost of Mandatory Supplemental Benefits

Participant Group	2020 Estimate	2020 SE	2020 95% CI Lower Bound	2020 95% CI Upper Bound	2020 *p*-value	2021 Estimate	2021 SE	2021 95% CI Lower Bound	2021 95% CI Upper Bound	2021 *p*-value	2022 Estimate	2022 SE	2022 95% CI Lower Bound	2022 95% CI Upper Bound	2022 *p*-value	ESS
2022 only	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	11.85	1.96	8.01	15.69	<0.001	666.86
2021 and 2022	N/A	N/A	N/A	N/A	N/A	13.52	2.56	8.51	18.53	<0.001	19.46	3.30	12.99	25.92	<0.001	455.71
2020, 2021, and 2022	3.42	2.94	−2.35	9.18	0.245	8.04	4.48	−0.75	16.83	0.073	14.86	5.59	3.90	25.83	0.008	414.93
2020 only	−5.69	2.88	−11.33	−0.06	0.048	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	72.53
2020 and 2022	1.51	12.48	−22.95	25.96	0.904	N/A	N/A	N/A	N/A	N/A	9.92	15.57	−20.59	40.43	0.524	20.74
2020 and 2021	−0.69	3.17	−6.89	5.51	0.828	−6.94	6.28	−19.24	5.37	0.269	N/A	N/A	N/A	N/A	N/A	12.75

SOURCE: RAND analysis of CMS and other data.
NOTE: N/A indicates outcome was not assessed.

Table L.8 presents the results of the Hospice Benefit component DD models for the cost of mandatory supplemental benefits by participation group.

Table L.8. Difference-in-Differences Model Results for Hospice Benefit Component: Cost of Mandatory Supplemental Benefits

Participant Group	2021 Estimate	2021 Standard Error	2021 95% CI Lower Bound	2021 95% CI Upper Bound	2021 *p*-value	2022 Estimate	2022 Standard Error	2022 95% CI Lower Bound	2022 95% CI Upper Bound	2022 *p*-value	ESS
2021 and 2022	12.18	4.82	2.72	21.63	0.012	11.13	5.72	−0.07	22.33	0.052	636.71
2022 only	N/A	N/A	N/A	N/A	N/A	0.84	3.82	−6.65	8.33	0.826	223.20

SOURCE: RAND analysis of CMS and other data.
NOTE: N/A indicates outcome was not assessed.

Summaries of Difference-in-Differences Model Results

Table L.9 presents the results of the DD regression models, estimating the association between VBID participation and MAPD bids by year and year of implementation.

Table L.9. Estimated Association Between Participation in VBID General or Hospice Benefit Component and MAPD Bids

Effect	Estimate	Standard Error	95% CI Lower Bound	95% CI Upper Bound	*p*-value	ESS
Year						
VBID General						
2020	−5.28	3.64	−12.42	1.86	0.148	967.20
2021	−3.03	2.66	−8.25	2.19	0.255	1,199.58
2022	−2.72	2.23	−7.09	1.65	0.222	2,164.72
Hospice						
2021	−18.39	6.93	−31.98	−4.80	0.008	1,404.94
2022	−23.23	5.79	−34.58	−11.89	<0.001	1,625.30
Year of implementation						
VBID General						
1	−5.15	2.04	−9.15	−1.14	0.012	2,243.19
2	1.07	3.18	−5.16	7.30	0.736	1,371.94
3	−1.50	5.72	−12.72	9.72	0.793	716.38
Hospice						
1	−11.31	4.93	−20.99	−1.64	0.022	1,625.30
2	−43.03	9.33	−61.31	−24.75	<0.001	1,404.94

SOURCE: RAND analysis of CMS and other data.

Table L.10 presents the results of the DD regression models estimating the association between VBID participation and total costs to CMS by year and year of implementation.

Table L.10. Estimated Association Between Participation in VBID General or Hospice Benefit Component and Total Costs to CMS

Effect	Estimate	Standard Error	95% CI Lower Bound	95% CI Upper Bound	*p*-value	ESS
Year						
VBID General						
2020	7.43	7.69	−7.64	22.50	0.334	651.66
2021	44.90	9.74	25.81	63.99	<0.001	1,009.16
Hospice						
2021	−1.77	15.79	−32.73	29.19	0.911	868.15
Year of implementation						
VBID General						
1	34.74	8.77	17.54	51.94	<0.001	1,100.40
2	32.70	11.74	9.70	55.71	0.005	560.42
Hospice						
1	−1.77	15.79	−32.73	29.19	0.911	868.15

SOURCE: RAND analysis of CMS and other data.

Table L.11 presents the results of the DD regression models, estimating the association between VBID participation and total premiums by year and year of implementation.

Table L.11. Estimated Association Between Participation in VBID General or Hospice Benefit Component and Total Premiums

Effect	Estimate	Standard Error	95% CI Lower Bound	95% CI Upper Bound	*p*-value	ESS
Year						
VBID General						
2020	−0.29	0.96	−2.18	1.59	0.759	1,029.92
2021	2.25	0.91	0.48	4.03	0.013	1,235.70
2022	1.33	0.48	0.39	2.27	0.006	2,230.73
Hospice						
2021	−4.49	2.49	−9.37	0.39	0.071	1,341.65
2022	−1.55	1.47	−4.43	1.34	0.294	1,612.34
Year of implementation						
VBID General						
1	1.26	0.46	0.36	2.15	0.006	2,325.31
2	2.44	0.80	0.86	4.01	0.002	1,434.45
3	−1.38	1.81	−4.93	2.17	0.445	736.58
Hospice						
1	−2.05	1.45	−4.90	0.80	0.158	1,612.34
2	−3.45	2.61	−8.56	1.67	0.187	1,341.65

SOURCE: RAND analysis of CMS and other data.

Table L.12 presents the results of the DD regression models estimating the association between VBID participation and cost of mandatory supplemental benefits by year and year of implementation.

Table L.12. Estimated Association Between Participation in VBID General or Hospice Benefit Component and Cost of Mandatory Supplemental Benefits

Effect	Estimate	Standard Error	95% CI Lower Bound	95% CI Upper Bound	p-value	ESS
Year						
VBID General						
2020	0.65	2.15	−3.57	4.86	0.763	520.95
2021	11.86	2.14	7.65	16.06	<0.001	883.39
2022	16.15	1.64	12.93	19.37	<0.001	1683.08
Hospice						
2021	12.18	4.82	2.72	21.63	0.012	636.71
2022	5.82	3.49	−1.02	12.66	0.095	859.90
Year of implementation						
VBID General						
1	11.72	1.33	9.11	14.34	<0.001	1768.36
2	16.11	2.64	10.93	21.28	<0.001	904.13
3	14.86	5.59	3.90	25.83	0.008	414.93
Hospice						
1	6.33	3.02	0.41	12.24	0.036	859.90
2	11.13	5.72	−0.07	22.33	0.052	636.71

SOURCE: RAND analysis of CMS and other data.
NOTE: CI indicates confidence interval.

Additional Regression Results Analyzing Mechanisms for Bid, Premium, and Cost to CMS Changes

Table L.13 presents the results of the DD regression models estimating the association between VBID participation and MA bids by year and year of implementation. MA bids are one component of the total MAPD bid.

Table L.13. Estimated Association Between Participation in VBID General or Hospice Benefit Component and MA Bids

Effect	Estimate	Standard Error	95% CI Lower Bound	95% CI Upper Bound	*p*-value	ESS
Year						
VBID General						
2020	−2.55	3.61	−9.63	4.53	0.480	611.40
2021	−9.08	2.71	−14.39	−3.77	<0.001	981.22
2022	−3.89	2.06	−7.92	0.15	0.059	1,789.78
Hospice						
2021	−18.70	6.21	−30.87	−6.53	0.003	1,462.20
2022	−23.01	5.59	−33.95	−12.06	<0.001	1,696.21
Year of implementation						
VBID General						
1	−7.08	1.89	−10.78	−3.38	<0.001	1,870.25
2	−1.95	3.09	−8.01	4.11	0.529	1,003.46
3	−1.64	5.75	−12.90	9.63	0.776	508.68
Hospice						
1	−11.56	4.73	−20.82	−2.30	0.014	1,696.21
2	−42.35	8.69	−59.38	−25.31	<0.001	1,462.20

SOURCE: RAND analysis of CMS and other data.
NOTE: CI indicates confidence interval.

Table L.14 presents the results of the DD regression models estimating the association between VBID participation and components of the MA bid by year and by year of implementation. The components of the MA bid are the Medicare-covered net PMPM costs, nonbenefit expenses allocated to MA-covered services, the gain and loss margins allocated to MA-covered services, and the projected MA risk score.

Table L.14. Estimated Association Between Participation in VBID General or Hospice Benefit Component and MA Bid Components

Effect	Estimate	Standard Error	95% CI Lower Bound	95% CI Upper Bound	*p*-value	ESS
Medicare-covered net PMPM						
Year						
VBID General						
2020	−5.73	7.10	−19.63	8.18	0.419	620.42
2021	20.39	7.50	5.69	35.08	0.007	983.03
2022	−5.53	8.09	−21.38	10.31	0.494	1,809.28
Hospice						
2021	−28.03	9.65	−46.95	−9.11	0.004	1,461.72
2022	−18.06	9.70	−37.08	0.95	0.063	1,697.81
Year of implementation						
VBID General						
1	−4.76	5.08	−14.73	5.20	0.349	1,890.01
2	14.91	14.42	−13.35	43.17	0.301	1,002.97
3	7.52	18.21	−28.18	43.21	0.680	519.75
Hospice						
1	−9.56	9.13	−27.46	8.33	0.295	1,697.81
2	−45.59	12.09	−69.30	−21.89	<0.001	1,461.72
Nonbenefit expenses allocated to MA-covered services						
Year						
VBID General						
2020	6.69	2.15	2.47	10.91	0.002	534.01
2021	−0.43	2.61	−5.55	4.69	0.870	919.72
2022	0.63	1.55	−2.41	3.67	0.686	1,708.95
Hospice						
2021	6.66	3.36	0.08	13.24	0.047	1,497.48
2022	0.14	2.30	−4.37	4.65	0.952	1,729.92
Year of implementation						
VBID General						
1	−1.31	1.58	−4.41	1.80	0.409	1,789.01
2	3.68	2.03	−0.31	7.66	0.071	937.59
3	11.02	2.39	6.33	15.71	<0.001	436.08
Hospice						
1	3.02	2.49	−1.86	7.89	0.225	1,729.92
2	0.71	3.10	−5.37	6.79	0.818	1,497.48
Gain/loss allocated to MA-covered services						
Year						
VBID General						
2020	7.14	5.87	−4.37	18.65	0.224	612.14
2021	5.69	5.28	−4.66	16.03	0.281	975.25
2022	19.12	3.73	11.80	26.43	<0.001	1,722.37
Hospice						

Effect	Estimate	Standard Error	95% CI Lower Bound	95% CI Upper Bound	*p*-value	ESS
2021	9.28	6.02	−2.52	21.08	0.123	1,459.46
2022	−14.32	6.02	−26.12	−2.52	0.017	1,687.25
Year of implementation						
VBID General						
1	11.48	3.69	4.24	18.71	0.002	1,802.12
2	18.61	4.71	9.38	27.84	<0.001	995.10
3	17.73	9.51	−0.91	36.37	0.062	512.53
Hospice						
1	−8.55	6.04	−20.38	3.28	0.157	1,687.25
2	−2.64	6.49	−15.37	10.08	0.684	1,459.46
Projected MA risk score						
Year						
VBID General						
2020	0.02	0.01	0.00	0.04	0.035	601.70
2021	0.04	0.01	0.03	0.06	<0.001	1,015.56
2022	0.02	0.01	0.01	0.04	<0.001	1,823.45
Hospice						
2021	0.02	0.02	−0.02	0.06	0.248	1,319.22
2022	0.00	0.01	−0.03	0.02	0.813	1,553.48
Year of implementation						
VBID General						
1	0.02	0.01	0.00	0.03	0.008	1,902.01
2	0.05	0.01	0.03	0.07	<0.001	1,035.43
3	0.05	0.02	0.02	0.08	<0.001	503.26
Hospice						
1	0.00	0.01	−0.02	0.02	0.962	1,553.48
2	0.02	0.03	−0.04	0.07	0.582	1,319.22

SOURCE: RAND analysis of CMS and other data.

Table L.15 presents the results of the DD regression models, estimating the association between VBID participation and Part D bids by year and by year of implementation.

Table L.15. Estimated Association Between Participation in VBID General or Hospice Benefit Component and Part D Bids

Effect	Estimate	Standard Error	95% CI Lower Bound	95% CI Upper Bound	*p*-value	ESS
Year						
VBID General						
2020	−0.14	0.81	−1.73	1.44	0.861	658.39
2021	8.19	0.90	6.43	9.96	<0.001	1,053.53
2022	3.09	0.84	1.44	4.74	<0.001	1,748.01
Hospice						
2021	2.63	1.54	−0.39	5.65	0.088	1,694.36
2022	2.78	1.29	0.26	5.30	0.031	1,910.13
Year of implementation						
VBID General						
1	2.43	0.82	0.82	4.04	0.003	1,826.75
2	8.09	0.70	6.72	9.46	<0.001	1,080.98
3	3.95	1.37	1.26	6.64	0.004	552.19
Hospice						
1	1.39	1.20	−0.96	3.75	0.246	1,910.13
2	5.49	1.90	1.78	9.21	0.004	1,694.36

SOURCE: RAND analysis of CMS and other data.

Table L.16 presents the results of the DD regression models estimating the association between VBID participation and components of the Part D bid by year and by year of implementation. The components of the Part D bid are the Part D standard coverage net PMPM, basic nonbenefit expenses, supplemental nonbenefit expenses, the basic gain and loss margins, and the projected Part D risk score.

Table L.16. Estimated Association Between Participation in VBID General or Hospice Benefit Component and Part D Bid Components

Effect	Estimate	Standard Error	95% CI Lower Bound	95% CI Upper Bound	*p*-value	ESS
Part D standard coverage net PMPM						
Year						
VBID General						
2020	0.34	1.07	−1.76	2.44	0.753	656.25
2021	7.78	1.20	5.42	10.14	<0.001	990.82
2022	1.79	0.78	0.25	3.33	0.023	1,732.79
Hospice						
2021	2.01	1.51	−0.95	4.96	0.183	1,763.67
2022	2.53	1.68	−0.76	5.83	0.132	1,973.30
Year of implementation						
VBID General						
1	1.62	0.79	0.07	3.17	0.041	1,810.09
2	7.13	1.15	4.89	9.38	<0.001	1,009.13
3	3.20	1.50	0.27	6.14	0.032	560.63
Hospice						
1	1.56	1.19	−0.78	3.89	0.191	1,973.30
2	4.02	2.87	−1.60	9.65	0.161	1,763.67
Part D basic nonbenefit expense						
Year						
VBID General						
2020	0.26	0.30	−0.32	0.85	0.375	744.51
2021	1.13	0.28	0.57	1.69	<0.001	1,094.08
2022	0.36	0.73	−1.07	1.79	0.621	1,875.63
Hospice						
2021	−0.99	0.45	−1.87	−0.10	0.030	1,694.05
2022	0.34	0.50	−0.64	1.31	0.498	1,908.76
Year of implementation						
VBID General						
1	0.05	0.69	−1.29	1.39	0.942	1,958.59
2	1.69	0.24	1.22	2.17	<0.001	1,112.32
3	0.65	0.43	−0.19	1.50	0.127	643.32
Hospice						
1	−0.57	0.32	−1.20	0.06	0.078	1,908.76
2	0.88	0.91	−0.90	2.66	0.333	1,694.05
Part D supplemental nonbenefit expense						
Year						
VBID General						
2020	0.31	0.12	0.07	0.55	0.012	753.32
2021	−1.01	0.10	−1.21	−0.81	<0.001	1,097.39
2022	−0.09	0.67	−1.41	1.23	0.894	1,889.77
Hospice						
2021	0.00	0.35	−0.70	0.69	0.995	1,693.31

Effect	Estimate	Standard Error	95% CI Lower Bound	95% CI Upper Bound	*p*-value	ESS
2022	−0.48	0.34	−1.15	0.19	0.163	1,912.41
Year of implementation						
VBID General						
1	0.17	0.63	−1.06	1.41	0.784	1,969.70
2	−1.23	0.11	−1.45	−1.02	<0.001	1,115.63
3	−0.84	0.19	−1.20	−0.47	<0.001	655.15
Hospice						
1	−0.18	0.21	−0.61	0.24	0.390	1,912.41
2	−0.61	0.66	−1.90	0.68	0.354	1,693.31
Part D basic gain-loss						
Year						
VBID General						
2020	−0.25	0.21	−0.66	0.15	0.217	720.08
2021	−0.56	0.17	−0.88	−0.23	<0.001	1,055.65
2022	0.31	0.17	−0.02	0.65	0.063	1,867.22
Hospice						
2021	1.06	0.42	0.24	1.89	0.012	1,483.76
2022	0.32	0.26	−0.20	0.83	0.228	1,700.92
Year of implementation						
VBID General						
1	0.22	0.16	−0.09	0.54	0.168	1,948.66
2	−0.26	0.16	−0.57	0.05	0.100	1,072.54
3	−0.90	0.35	−1.58	−0.22	0.010	621.76
Hospice						
1	0.54	0.23	0.09	1.00	0.019	1,700.92
2	0.59	0.49	−0.37	1.55	0.228	1,483.76
Part D supplemental gain-loss						
Year						
VBID General						
2020	0.02	0.08	−0.14	0.17	0.821	752.34
2021	−0.25	0.04	−0.33	−0.16	<0.001	1,098.63
2022	0.14	0.08	−0.02	0.29	0.084	1,901.01
Hospice						
2021	0.98	0.33	0.35	1.62	0.003	1,693.92
2022	0.36	0.16	0.04	0.67	0.026	1,909.50
Year of implementation						
VBID General						
1	0.13	0.07	−0.01	0.27	0.068	1,983.53
2	−0.23	0.05	−0.32	−0.13	<0.001	1,116.90
3	−0.08	0.09	−0.26	0.10	0.413	651.55
Hospice						
1	0.50	0.18	0.15	0.85	0.005	1,909.50
2	0.69	0.28	0.14	1.24	0.014	1,693.92
Part D projected risk score						
Year						

Effect	Estimate	Standard Error	95% CI Lower Bound	95% CI Upper Bound	*p*-value	ESS
VBID General						
2020	0.00	0.01	−0.01	0.01	0.948	694.21
2021	−0.02	0.01	−0.04	−0.01	<0.001	1,065.58
2022	0.01	0.01	0.00	0.02	0.137	1,889.77
Hospice						
2021	0.00	0.01	−0.02	0.03	0.713	1,695.67
2022	0.00	0.01	−0.02	0.03	0.826	1,910.37
Year of implementation						
VBID General						
1	−0.01	0.00	−0.02	0.00	0.112	1,982.53
2	0.01	0.01	−0.01	0.02	0.235	1,085.36
3	0.01	0.01	−0.01	0.03	0.195	581.67
Hospice						
1	0.00	0.01	−0.02	0.02	0.956	1,910.37
2	0.01	0.02	−0.03	0.05	0.575	1,695.67

SOURCE: RAND analysis of CMS and other data.

Table L.17 presents the results of the DD regression models estimating the association between VBID participation and MA costs to CMS by year and by year of implementation.

Table L.17. Estimated Association Between Participation in VBID General or Hospice Benefit Component and MA Costs to CMS

Effect	Estimate	Standard Error	95% CI Lower Bound	95% CI Upper Bound	*p*-value	ESS
Year						
VBID General						
2020	4.52	8.13	−11.42	20.45	0.579	590.25
2021	34.49	9.40	16.08	52.91	<0.001	941.57
2022	24.83	7.63	9.88	39.78	0.001	1,754.65
Hospice						
2021	13.36	14.73	−15.52	42.24	0.365	1,503.81
2022	−18.62	12.29	−42.71	5.48	0.130	1,737.45
Year of implementation						
VBID General						
1	10.52	5.98	−1.20	22.24	0.078	1,834.38
2	51.98	12.29	27.89	76.06	<0.001	961.26
3	50.33	19.27	12.57	88.10	0.009	490.82
Hospice						
1	−5.41	10.88	−26.74	15.93	0.619	1,737.45
2	−13.94	20.39	−53.91	26.03	0.494	1,503.81

SOURCE: RAND analysis of CMS and other data.

Table L.18 presents the results of the DD regression models estimating the association between VBID participation and Part D costs to CMS by year and by year of implementation.

Table L.18. Estimated Association Between VBID Participation and Part D Costs to CMS

Effect	Estimate	Standard Error	95% CI Lower Bound	95% CI Upper Bound	*p*-value	ESS
Year						
VBID General						
2020	−0.29	2.12	−4.45	3.87	0.892	665.56
2021	4.36	2.24	−0.02	8.75	0.051	917.22
Hospice						
2021	−1.32	2.15	−5.52	2.89	0.539	1,406.81
Year of implementation						
VBID General						
1	3.38	2.02	−0.59	7.34	0.095	1,110.30
2	1.67	2.74	−3.71	7.05	0.543	472.48
Hospice						
1	−1.32	2.15	−5.52	2.89	0.539	1,406.81

SOURCE: RAND analysis of CMS and other data.

Table L.19 presents the results of the DD regression models, estimating the association between VBID participation and components of the Part D costs to CMS by year and by year of implementation. The components of the Part D costs to CMS are the direct subsidy, LIS payments (the sum of LIPS and LICS), and reinsurance.

Table L.19. Estimated Association Between Participation in VBID General or Hospice Benefit Component and Part D Cost to CMS Components

Effect	Estimate	Standard Error	95% CI Lower Bound	95% CI Upper Bound	*p*-value	ESS
Direct subsidy						
Year						
VBID General						
2020	0.09	0.56	−1.01	1.19	0.869	662.27
2021	0.29	0.39	−0.48	1.06	0.465	909.26
Hospice						
2021	−0.50	0.85	−2.16	1.17	0.560	1,472.05
Year of implementation						
VBID General						
1	0.35	0.36	−0.35	1.04	0.329	1,100.77
2	−0.26	0.64	−1.51	0.98	0.682	470.76
Hospice						
1	−0.50	0.85	−2.16	1.17	0.560	1,472.05
LIS (LICS + LIPS)						
Year						
VBID General						
2020	0.01	1.32	−2.59	2.60	0.996	660.18
2021	3.13	1.37	0.45	5.82	0.022	896.71
Hospice						
2021	−1.72	0.93	−3.53	0.10	0.064	1,389.41
Year of implementation						
VBID General						
1	2.42	1.24	−0.01	4.85	0.051	1,090.35
2	1.54	1.43	−1.27	4.34	0.284	466.53
Hospice						
1	−1.72	0.93	−3.53	0.10	0.064	1,389.41
Reinsurance						
Year						
VBID General						
2020	−0.67	1.39	−3.40	2.05	0.627	663.21
2021	1.60	1.26	−0.86	4.07	0.202	912.69
Hospice						
2021	1.54	1.66	−1.72	4.80	0.354	1,472.09
Year of implementation						
VBID General						
1	1.09	1.13	−1.12	3.31	0.334	1,107.08
2	0.40	1.94	−3.40	4.20	0.836	468.82
Hospice						
1	1.54	1.66	−1.72	4.80	0.354	1,472.09

SOURCE: RAND analysis of CMS and other data.

Table L.20 presents the results of the DD regression models, estimating the association between VBID participation and MA premiums by year and by year of implementation.

Table L.20. Estimated Association Between Participation in VBID General or Hospice Benefit Component and MA Premiums

Effect	Estimate	Standard Error	95% CI Lower Bound	95% CI Upper Bound	*p*-value	ESS
Year						
VBID General						
2020	−0.19	1.15	−2.44	2.06	0.867	572.78
2021	−1.69	0.64	−2.93	−0.44	0.008	949.45
2022	−0.56	0.49	−1.53	0.41	0.260	1,746.58
Hospice						
2021	−1.94	1.95	−5.77	1.89	0.320	1,460.45
2022	−0.01	0.99	−1.95	1.94	0.996	1,696.55
Year of implementation						
VBID General						
1	−0.60	0.47	−1.52	0.32	0.204	1,825.15
2	−1.39	0.67	−2.71	−0.07	0.039	969.12
3	−0.71	1.81	−4.26	2.83	0.694	474.54
Hospice						
1	−0.07	1.12	−2.26	2.12	0.949	1,696.55
2	−1.81	1.53	−4.81	1.19	0.238	1,460.45

Table L.21 presents the results of the DD regression models, estimating the association between VBID participation and components of the MA premium by year and by year of implementation. In addition to the MA bid and mandatory supplemental benefits costs, the MA premium is affected by plan choices regarding allocation of the MA rebate. Table L.21 therefore shows regression results for the MA rebate, for the allocation of the rebate to reduce cost sharing, for the allocation of the rebate to reduce MSB costs, and for allocation of the rebate to reduce the Part B premium.

Table L.21. Estimated Association Between Participation in VBID General or Hospice Benefit Component and MA Premium Components

Effect	Estimate	Standard Error	95% CI Lower Bound	95% CI Upper Bound	*p*-value	ESS
MA Rebate						
Year						
VBID General						
2020	−1.00	2.72	−6.34	4.34	0.713	546.47
2021	12.91	2.73	7.56	18.27	<0.001	908.06
2022	12.17	2.08	8.09	16.25	<0.001	1,684.83
Hospice						
2021	21.99	5.68	10.85	33.13	<0.001	1,013.97
2022	10.06	4.71	0.83	19.28	0.033	1,235.09
Year of implementation						
VBID General						
1	9.56	1.76	6.11	13.00	<0.001	1,770.44
2	13.21	3.23	6.88	19.54	<0.001	928.41
3	13.87	6.12	1.88	25.86	0.023	440.51
Hospice						
1	8.66	3.74	1.33	15.99	0.021	1,235.09
2	24.88	8.52	8.18	41.57	0.003	1,013.97
Rebate allocation: reduced Part A/B cost sharing						
Year						
VBID General						
2020	−1.64	1.31	−4.20	0.92	0.209	566.07
2021	1.05	0.98	−0.87	2.97	0.285	937.04
2022	−3.60	0.93	−5.42	−1.78	<0.001	1,744.25
Hospice						
2021	−4.10	2.41	−8.82	0.61	0.088	1,461.60
2022	−4.05	1.61	−7.21	−0.89	0.012	1,694.42
Year of implementation						
VBID General						
1	−1.75	0.79	−3.29	−0.20	0.026	1,825.09
2	−3.22	1.12	−5.41	−1.03	0.004	956.65
3	−0.22	2.60	−5.31	4.87	0.933	465.62
Hospice						
1	−4.27	1.71	−7.63	−0.91	0.013	1,694.42
2	−3.65	2.18	−7.93	0.63	0.095	1,461.60
Rebate allocation: MSB (additional services)						
Year						
VBID General						
2020	−1.28	2.81	−6.78	4.23	0.649	616.17
2021	11.65	2.63	6.50	16.80	<0.001	988.76
2022	19.01	1.96	15.17	22.86	<0.001	1,782.47
Hospice						
2021	19.57	6.17	7.48	31.67	0.002	1,320.49

Effect	Estimate	Standard Error	95% CI Lower Bound	95% CI Upper Bound	*p*-value	ESS
2022	11.62	4.47	2.85	20.39	0.009	1,549.06
Year of implementation						
VBID General						
1	12.94	1.60	9.80	16.08	<0.001	1,867.93
2	17.96	3.14	11.80	24.12	<0.001	1,008.55
3	16.99	6.53	4.18	29.79	0.009	510.93
Hospice						
1	9.59	3.75	2.25	16.94	0.010	1,549.06
2	23.76	7.73	8.60	38.92	0.002	1,320.49
Rebate Allocation: Part B premium buydown						
Year						
VBID General						
2020	0.45	0.47	−0.49	1.38	0.348	620.84
2021	−1.05	0.37	−1.77	−0.33	0.004	992.75
2022	−0.49	0.39	−1.26	0.28	0.213	1,819.40
Hospice						
2021	−0.82	1.99	−4.72	3.08	0.680	1,315.63
2022	−0.30	1.27	−2.78	2.19	0.815	1,549.94
Year of implementation						
VBID General						
1	−0.48	0.33	−1.12	0.17	0.149	1,900.22
2	−0.81	0.56	−1.91	0.29	0.151	1,017.25
3	−0.10	0.59	−1.25	1.06	0.871	515.53
Hospice						
1	−0.57	0.97	−2.47	1.34	0.558	1,549.94
2	−0.26	2.62	−5.40	4.88	0.921	1,315.63

Table L.22 presents the results of the DD regression models, estimating the association between VBID participation and the Part D premium by year and by year of implementation. The total Part D premium is the sum of the basic and supplemental Part D premiums.

Table L.22. Estimated Association Between VBID Participation and Part D Premiums

Effect	Estimate	Standard Error	95% CI Lower Bound	95% CI Upper Bound	*p*-value	ESS
Part D basic premium						
Year						
VBID General						
2020	0.21	0.61	−0.97	1.40	0.723	665.49
2021	3.04	0.52	2.02	4.06	<0.001	1,055.20
2022	0.93	0.70	−0.45	2.30	0.186	1,810.49
Hospice						
2021	−3.93	1.68	−7.23	−0.64	0.019	1,495.79
2022	−1.95	1.16	−4.21	0.32	0.093	1,749.41
Year of implementation						
VBID General						
1	1.15	0.64	−0.10	2.40	0.071	1,898.16
2	2.78	0.53	1.75	3.81	<0.001	1,073.20
3	−1.34	0.82	−2.96	0.27	0.102	559.82
Hospice						
1	−2.56	1.01	−4.53	−0.59	0.011	1,749.41
2	−2.67	2.09	−6.77	1.43	0.203	1,495.79
Part D supplemental premium						
Year						
VBID General						
2020	0.38	0.28	−0.16	0.93	0.169	777.38
2021	−0.10	0.18	−0.46	0.26	0.582	1,138.15
2022	0.51	0.53	−0.53	1.56	0.336	1,961.05
Hospice						
2021	1.69	1.63	−1.50	4.89	0.300	1,305.74
2022	0.46	0.98	−1.46	2.38	0.637	1,556.75
Year of implementation						
VBID General						
1	0.55	0.50	−0.43	1.52	0.271	2,049.99
2	−0.12	0.19	−0.49	0.26	0.533	1,155.53
3	0.13	0.56	−0.96	1.22	0.813	671.06
Hospice						
1	0.59	0.83	−1.03	2.22	0.475	1,556.75
2	1.42	1.90	−2.30	5.15	0.455	1,305.74
Part D total premium						
Year						
VBID General						
2020	0.76	0.66	−0.54	2.05	0.252	680.35
2021	3.14	0.52	2.11	4.16	<0.001	1,072.70
2022	1.39	0.40	0.61	2.17	<0.001	1,849.77
Hospice						
2021	−2.47	1.86	−6.12	1.18	0.185	1,304.16
2022	−1.64	1.22	−4.04	0.75	0.179	1,548.14

Effect	Estimate	Standard Error	95% CI Lower Bound	95% CI Upper Bound	*p*-value	ESS
Year of implementation						
VBID General						
1	1.69	0.36	0.98	2.39	<0.001	1,937.51
2	2.81	0.54	1.76	3.86	<0.001	1,090.60
3	−1.10	0.94	−2.94	0.74	0.243	574.72
Hospice						
1	−2.06	1.17	−4.35	0.23	0.079	1,548.14
2	−1.61	2.07	−5.66	2.45	0.437	1,304.16

Table L.23 presents the results of the DD regression models, estimating the association between VBID participation and components of the Part D premium by year and by year of implementation. The components of the Part D premium are the basic and supplemental premiums before any MA rebates are applied to buy down the premium and the amount of the basic and supplemental premium buydowns.

Table L.23. Estimated Association Between Participation in VBID General or Hospice Benefit Component and Part D Premium Components

Effect	Estimate	Standard Error	95% CI Lower Bound	95% CI Upper Bound	*p*-value	ESS
Part D basic premium before buydown						
Year						
VBID General						
2020	1.05	0.88	−0.67	2.77	0.230	675.54
2021	8.20	0.88	6.48	9.92	<0.001	1,079.36
2022	3.09	0.84	1.45	4.74	<0.001	1,766.10
Hospice						
2021	3.78	1.59	0.66	6.91	0.018	1,496.27
2022	3.05	1.32	0.46	5.64	0.021	1,762.49
Year of implementation						
VBID General						
1	2.60	0.82	0.99	4.20	0.002	1,849.97
2	8.12	0.68	6.79	9.46	<0.001	1,097.97
3	4.29	1.37	1.61	6.97	0.002	573.07
Hospice						
1	1.59	1.23	−0.83	4.00	0.198	1,762.49
2	6.81	1.99	2.91	10.72	<0.001	1,496.27
Part D basic buydown						
Year						
VBID General						
2020	0.55	0.84	−1.09	2.20	0.511	771.88
2021	4.86	0.64	3.61	6.11	<0.001	1,132.58
2022	1.87	0.54	0.82	2.92	<0.001	1,884.91
Hospice						
2021	7.11	2.06	3.07	11.14	<0.001	1,305.88
2022	4.58	1.53	1.58	7.57	0.003	1,578.49
Year of implementation						
VBID General						
1	1.13	0.50	0.15	2.10	0.023	1,968.72
2	5.20	0.71	3.80	6.60	<0.001	1,152.69
3	4.92	1.06	2.85	6.98	<0.001	667.95
Hospice						
1	3.83	1.34	1.20	6.46	0.004	1,578.49
2	8.66	2.52	3.71	13.60	<0.001	1,305.88
Part D supplemental premium before buydown						
Year						
VBID General						
2020	1.26	0.59	0.09	2.42	0.034	787.15
2021	−3.92	0.44	−4.78	−3.06	<0.001	1,146.07
2022	−3.15	0.87	−4.86	−1.44	<0.001	1,955.20
Hospice						
2021	4.38	1.73	0.98	7.78	0.012	1,495.35

Effect	Estimate	Standard Error	95% CI Lower Bound	95% CI Upper Bound	*p*-value	ESS
2022	1.65	1.32	−0.94	4.24	0.212	1,766.85
Year of implementation						
VBID General						
1	−2.30	0.82	−3.91	−0.69	0.005	2,045.12
2	−4.04	0.47	−4.96	−3.12	<0.001	1,163.92
3	−3.36	0.81	−4.95	−1.78	<0.001	679.38
Hospice						
1	1.92	1.12	−0.27	4.12	0.086	1,766.85
2	3.82	2.34	−0.77	8.40	0.103	1,495.35
Part D supplemental premium buydown						
Year						
VBID General						
2020	0.91	0.65	−0.36	2.18	0.162	787.56
2021	−3.77	0.47	−4.69	−2.85	<0.001	1,147.37
2022	−3.59	0.57	−4.71	−2.46	<0.001	1,959.15
Hospice						
2021	2.65	2.44	−2.14	7.44	0.279	1,447.30
2022	0.97	1.71	−2.37	4.32	0.568	1,712.19
Year of implementation						
VBID General						
1	−2.78	0.54	−3.84	−1.71	<0.001	2,048.33
2	−3.87	0.50	−4.85	−2.90	<0.001	1,164.79
3	−3.45	0.99	−5.39	−1.51	<0.001	680.96
Hospice						
1	1.03	1.42	−1.76	3.81	0.471	1,712.19
2	2.54	3.03	−3.40	8.48	0.402	1,447.30
Part D supplemental gain-loss						
Year						
VBID General						
2020	0.02	0.08	−0.14	0.17	0.821	752.34
2021	−0.25	0.04	−0.33	−0.16	<0.001	1,098.63
2022	0.14	0.08	−0.02	0.29	0.084	1,901.01
Hospice						
2021	0.98	0.33	0.35	1.62	0.003	1,693.92
2022	0.36	0.16	0.04	0.67	0.026	1,909.50
Year of implementation						
VBID General						
1	0.13	0.07	−0.01	0.27	0.068	1,983.53
2	−0.23	0.05	−0.32	−0.13	<0.001	1,116.90
3	−0.08	0.09	−0.26	0.10	0.413	651.55
Hospice						
1	0.50	0.18	0.15	0.85	0.005	1,909.50
2	0.69	0.28	0.14	1.24	0.014	1,693.92
Part D supplemental nonbenefit expense						

Effect	Estimate	Standard Error	95% CI Lower Bound	95% CI Upper Bound	*p*-value	ESS
Year						
VBID General						
2020	0.31	0.12	0.07	0.55	0.012	753.32
2021	−1.01	0.10	−1.21	−0.81	<0.001	1,097.39
2022	−0.09	0.67	−1.41	1.23	0.894	1,889.77
Hospice						
2021	0.00	0.35	−0.70	0.69	0.995	1,693.31
2022	−0.48	0.34	−1.15	0.19	0.163	1,912.41
Year of implementation						
VBID General						
1	0.17	0.63	−1.06	1.41	0.784	1,969.70
2	−1.23	0.11	−1.45	−1.02	<0.001	1,115.63
3	−0.84	0.19	−1.20	−0.47	<0.001	655.15
Hospice						
1	−0.18	0.21	−0.61	0.24	0.390	1,912.41
2	−0.61	0.66	−1.90	0.68	0.354	1,693.31

Table L.24 shows the relationship between VBID participation and a dichotomized variable indicating whether the plan had a nonzero premium, estimated using a linear probability model. We found a statistically significant association between VBID General participation and the probability of having a nonzero premium in 2022; we also estimated a marginally statistically significant association between VBID General participation and having a nonzero premium in the first year of implementation. None of the other results are statistically significant.

Table L.24. Estimated Association Between Participation in VBID General or Hospice Benefit Component and the Probability of Having a Non-Zero Premium

Effect	Estimate	Standard Error	95% CI Lower Bound	95% CI Upper Bound	*p*-value	ESS
Year						
VBID General						
2020	0.02	0.02	−0.03	0.06	0.473	1,016.85
2021	−0.01	0.01	−0.03	0.01	0.402	1,276.45
2022	0.03	0.01	0.01	0.05	0.004	2,230.72
Hospice						
2021	−0.05	0.04	−0.12	0.03	0.200	1,341.49
2022	−0.02	0.03	−0.07	0.04	0.506	1,594.54
Year of implementation						
VBID General						
1	0.02	0.01	0.00	0.03	0.062	2,320.97
2	0.02	0.01	−0.01	0.04	0.194	1,436.68
3	0.00	0.02	−0.04	0.05	0.870	766.38
Hospice						
1	−0.03	0.03	−0.08	0.02	0.233	1,594.54
2	−0.02	0.04	−0.10	0.05	0.590	1,341.49

Descriptive Analysis of MSB

In this section, we provide some additional descriptive analysis to show the number and types of MSB that plans offered in 2022. We note that these analyses are unadjusted for differences in VBID-participating and eligible comparison plans.

Table L.25 shows the average number of mandatory supplemental benefits offered by VBID General participants, Hospice Benefit component participants, and eligible comparison plans in 2022. Plans participating in VBID General offered, on average, 19.3 mandatory supplemental benefits, while eligible comparison plans offered slightly fewer: 18.4 on average. Hospice Benefit component plans offered on average 18.9 mandatory supplemental benefits, slightly more than eligible comparison plans.

Table L.25. Average Number of Mandatory Supplemental Benefits by Participation Status, 2022

	VBID General–Participating Plans	Hospice Benefit Component Plans	Eligible Comparison Plans
N	861	109	2,347
Number of mandatory supplemental benefits	19.3 (3.4)	18.9 (3.7)	18.4 (3.7)

SOURCE: RAND analysis of publicly available PBP benefits data.

Table L.26 shows the percent of enrollees in each participation status group who were in a plan offering each of the mandatory supplemental benefits shown. More than 90% of enrollees in VBID General plans, Hospice Benefit component plans, and eligible comparison plans had access to additional telehealth benefits and worldwide emergency and urgent coverage. While more than 90% of plans implementing VBID General and eligible comparison plan enrollees had access to worldwide emergency transportation, additional blood coverage, annual physical exams, fitness benefits, dental exams, teeth cleaning, and eye care benefits, a smaller percentage of enrollees in Hospice Benefit component plans had access to these benefits. More than 95% of enrollees in plans implementing VBID General had access to OTC items, while 84% of eligible comparison plan and 89.6% of Hospice Benefit component beneficiaries had access to this benefit. More than a third (36.3%) of Hospice Benefit component enrollees had access to alternative therapies, while less than 10% of enrollees in VBID General and eligible comparison plans had access to this benefit. A larger proportion of Hospice Benefit component enrollees also had access to bathroom safety devices (33.7%) and home-based palliative care (9.5%), compared with plans implementing VBID General and eligible comparison plan enrollees.

Table L.26. Percent of Enrollees with Access to Mandatory Supplemental Benefit Offerings by Participation Status, 2022

Supplemental Benefit	VBID General–Participating Plans	Hospice Benefit Component Plans	Eligible Comparison Plans
Additional days	89.4%	86.4%	88.4%
Non-Medicare-covered stay	0.0%	0.0%	0.7%
Upgrades	0.0%	1.8%	6.5%
Additional days	1.9%	4.6%	14.3%
Non-Medicare-covered stay	0.0%	0.0%	0.0%
Additional cardiac rehabilitation services	0.0%	0.0%	0.3%
Additional intensive cardiac rehabilitation services	0.0%	0.0%	0.0%
Additional pulmonary rehabilitation services	0.0%	0.0%	0.3%
Additional supervised exercise therapy for symptomatic peripheral artery disease services	0.0%	0.0%	0.0%
Worldwide emergency coverage	99.2%	99.8%	97.6%
Worldwide urgent coverage	99.2%	99.8%	96.1%
Worldwide emergency transportation	93.6%	66.6%	81.3%
Routine care	36.7%	48.1%	21.2%
Routine foot care	58.2%	67.0%	48.5%
Additional telehealth benefit for Part B services	99.2%	99.9%	97.4%
Outpatient blood services: three (3) pint deductible waived	95.4%	76.7%	95.5%
Transportation: plan approved health-related location	74.4%	53.3%	40.0%
Transportation: any health-related location	0.5%	8.0%	1.2%
Acupuncture	76.7%	56.4%	33.1%
OTC items	95.5%	89.6%	84.1%
Limited duration meal benefit	89.5%	60.4%	67.3%
Annual physical exam	92.4%	66.2%	91.9%
Health education	14.0%	46.4%	36.7%

Supplemental Benefit	VBID General–Participating Plans	Hospice Benefit Component Plans	Eligible Comparison Plans
Nutritional/dietary benefit	13.1%	41.9%	28.5%
Additional sessions of smoking and tobacco cessation counseling	18.6%	28.6%	25.9%
Fitness benefit	96.9%	69.6%	97.3%
Enhanced disease management	2.2%	9.3%	7.9%
Telemonitoring services	1.9%	0.0%	5.6%
Remote access technologies (including web or phone-based technologies and nursing hotline)	42.4%	81.4%	87.1%
bathroom safety devices	7.9%	33.7%	9.9%
counseling services	0.9%	10.8%	9.7%
in-home safety assessment	0.0%	3.8%	4.1%
Personal emergency response system	47.9%	39.8%	26.0%
Medical nutrition therapy (MNT)	3.3%	9.5%	9.2%
Post discharge in-home medication reconciliation	0.6%	0.1%	2.5%
Re-admission prevention	2.0%	2.8%	2.3%
Wigs for hair loss related to chemotherapy	10.8%	0.2%	1.3%
weight management programs	1.8%	3.8%	1.3%
alternative therapies	6.4%	36.3%	4.8%
therapeutic massage	3.3%	6.0%	2.1%
oral exams	92.2%	83.3%	92.8%
Prophylaxis (cleaning)	92.2%	83.3%	92.4%
Routine eye exams	95.1%	86.7%	98.7%
Routine hearing exams	94.5%	81.2%	90.2%
Fitting/evaluation for hearing aid	71.5%	66.3%	58.7%
Hearing aids (all types)	96.1%	95.7%	88.2%
Adult day care	0.4%	0.0%	0.3%
Home-based palliative care	0.0%	9.5%	3.1%
In-home supports	15.5%	8.9%	13.6%
Caregiver supports	0.6%	0.0%	4.8%

SOURCE: RAND analysis of enrollment data and publicly available PBP benefits data.

Appendix M. Hospice-Specific Analyses

In this appendix, we present information to support the analysis of outcomes related to the Hospice Benefit component; these outcomes are discussed in Chapters 9 and 10 in the main report.

Outcome Measure Definitions

Table M.1 lists all outcomes and their corresponding denominators. Some outcome variables had additional eligibility requirements and restrictions. For both VBID and comparison beneficiaries, all outcome variables were obtained from FFS hospice claims with the exception of the CAHPS Hospice Survey summary measure score, which was obtained from CAHPS Hospice Survey responses. As these responses do not contain beneficiary names or identification numbers (for example, HIC and MBI), we linked CAHPS Hospice Survey responses to hospice claims data by matching, using available variables (hospice CCN, beneficiary date of death, date of birth, hospice admission date, primary diagnosis, and sex).

The CAHPS Hospice Survey is administered to family caregivers after the death of a hospice patient; CMS requires that hospices meeting eligibility criteria contract with a survey vendor to collect CAHPS Hospice Survey data as part of their participation in the Hospice Quality Reporting Program. CAHPS Hospice Survey measures are endorsed by the National Quality Forum, and these measures assess aspects of care that are important to hospice patients and their families, including hospice team communication, timeliness of care, respectful treatment, help for pain and other symptoms, emotional and spiritual support, and training the family to care for hospice patients at home (CAHPS Hospice Survey, undated). The summary CAHPS Hospice Survey measure scores were calculated for each beneficiary by averaging each beneficiary's score across CAHPS measures. In this calculation, the six composite measures assessing specific aspects of care experience received equal weight, whereas the two global assessment measures—overall rating and willingness to recommend—each received half weight because both are overall assessments of care delivered by the hospice. For beneficiaries that were missing scores for a given measure, mean scores within year were imputed for the measure. Scores were adjusted for mode of survey administration, and weights for these outcomes additionally accounted for differences in case mix using the following variables in keeping with CMS guidance for adjustment of CAHPS Hospice Survey measure scores: decedent age, payer for hospice care (including payers in addition to Medicare listed in the hospice administrative record), primary diagnosis, and length of final episode of hospice care; respondent age, education, relationship to caregiver, language spoken at home, and survey language; and

response percentile (the length of lag time between decedent death and survey response) (CAHPS Hospice Survey, 2023).

Table M.1. Denominators for Outcome Variables

Outcome measure	Denominator
Hospice enrollment in the year of death	All decedents
Length of final episode of hospice care (days)	Hospice decedents
Final length of stay (LOS) less than three days	Hospice decedents
Final LOS less than seven days	Hospice decedents
Final LOS more than 180 days	Hospice decedents
Professional visits in at least two of last three days of life	Hospice decedents
Summary CAHPS Hospice Survey score	Hospice decedents
Any live discharges from hospice in the given year	Hospice enrollees
Transfer from hospice in the given year	Hospice enrollees
Revocation in the given year	Hospice enrollees
Death within 30 days of a live discharge but before the end of the calendar year	Hospice enrollees that had a live discharge
Transfer to another hospice within seven days of a live discharge but before the end of the calendar year 2023	Hospice enrollees that had a live discharge

In- and Out-of-Network Hospice Characteristics

To better understand characteristics of the hospices in VBID-participating plans' service areas, in Chapter 9, we describe in-network and OON hospices, comparing in-network and OON hospices that served at least one VBID beneficiary. To examine the types of hospices that POs included in their VBID networks, we also compared the characteristics of in-network hospices with those of all other hospices that were in a PO's service area, regardless of whether the hospice delivered care to any VBID beneficiaries (Table M.2). We conducted statistical significance testing via logistic, multinomial logistic, or linear regression models in which the outcomes were the characteristics of interest and the predictors included indicators for hospice network status. Findings in these two tables are similar.

Table M.2. Characteristics of In-Network Hospices and Out-of-Network Hospices in VBID-Participating Plans' Service Areas, 2022

Characteristic		In-Network Hospices[a] (*N* = 306)	Out-of-Network Hospices[a] (*N* = 4,183)	*p*-value
Size (number of Medicare beneficiaries per year)[b] (*N*, %)				<0.001
<50		12 (3.9%)	448 (10.7%)	
50–100	19 (6.2%)	606 (14.5%)		
101–249		77 (25.2%)	1,158 (27.7%)	
250–499		75 (24.5%)	884 (21.1%)	
500+		112 (36.6%)	934 (22.3%)	
< 1% of hospice decedents in freestanding hospice inpatient unit[c] (*N*, %)		229 (74.8%)	3,246 (77.6%)	0.071
Hospice provides care in rural area[d] (*N*, %)		32 (10.5%)	529 (12.6%)	<0.001
Ownership[e] (*N*, %)				0.454
For-profit		202(66.0%)	2,840 (67.9%)	
Nonprofit		66 (21.6%)	871 (20.8%)	
Other		29 (9.5%)	472 (11.3%)	
Part of a hospice chain[f] (*N*, %)		123 (40.2%)	1,467 (35.1%)	0.023
In-network and/or in service area of more than one PO (*N*, %)		268 (87.6%)	3,230 (77.2%)	<0.001
Summary CAHPS Hospice Survey measure[g] (mean, SD)		81.2 (4.5)	81.6 (4.9)	0.226
No decedents received general inpatient care or continuous home care in last seven days of life[c] (*N*, %)		95 (31.0%)	1,330 (31.8%)	0.010
Hospice decedents in assisted living facilities[c] (*N*, %)				0.064
Quartile 1: <1.44%		58 (19.0%)	1,001 (23.9%)	
Quartile 2: 1.44%–<6.60%		72 (23.5%)	994 (23.8%)	
Quartile 3: 6.60%–<17.65%		72 (23.5%)	1,005 (24.0%)	
Quartile 4: 17.65%+		93 (30.4%)	994 (23.8%)	
Hospice decedents in nursing homes[c] (*N*, %)				<0.001
Quartile 1: <2.90%		69 (22.5%)	994 (23.8%)	
Quartile 2: 2.90%–<10.55%		85 (27.8%)	998 (23.9%)	
Quartile 3: 10.55%–<25.00%		93 (30.4%)	998 (23.9%)	
Quartile 4: 25.00%+		48 (15.7%)	1,004 (24.0%)	
Patients with a primary diagnosis of dementia[c] (*N*, %)				0.440
Quartile 1: <11.07%		68 (22.2%)	996 (23.8%)	
Quartile 2: 11.07%–<18.02%		76 (24.8%)	998 (23.9%)	
Quartile 3: 18.02%–<26.25%		82 (26.8%)	999 (23.9%)	
Quartile 4: 26.25%+		69 (22.5%)	1,001 (23.9%)	
Rate of live discharge[c] (mean, SD)		0.195 (0.123)	0.224 (0.191)	0.023

Characteristic	In-Network Hospices[a] (*N* = 306)	Out-of-Network Hospices[a] (*N* = 4,183)	*p*-value
Rate of revocations[c]	0.075 (0.062)	0.108 (0.149)	<0.001
Rate of transfers[c]	0.034 (0.052)	0.039 (0.069)	0.398
Proportion of live discharges from hospice followed by death within 30 days[c]	0.118 (0.089)	0.117 (0.096)	0.860
Proportion of live discharges from hospice followed by transfer to another hospice within seven days[c]	0.002 (0.012)	0.002 (0.017)	0.837

SOURCE: RAND analysis of data submitted by POs as part of the VBID Model test.
NOTE: Rows for some characteristics do not add up to 100% because of missing data for a small number of hospices.
[a] Columns reflect the distinct number of all in-network hospices and hospices that are in a PO's service area but not in-network for that PO, respectively, de-duplicating hospices that are in-network and/or in the service area of more than one PO within each group of hospices.
[b] *Hospice size* was obtained from the 2021 Medicare hospice claims files and was defined as the number of patients, including decedents, live discharges, and patients still under care.
[c] These variables were calculated using the 2021 Medicare hospice claims files.
[d] Hospices were defined as rural if more than 80% of patients in the 2021 Medicare hospice claims files lived in a rural zip code and the December 2021 Provider of Services file indicated that the hospice was rural.
[e] Ownership was obtained from the December 2021 Provider of Services file. *Other* includes government and other profit statuses.
[f] Chain status was determined by the research team using web searches.
[g] The summary CAHPS Hospice survey measure scores were calculated for each hospice by averaging each hospice's performance across CAHPS Hospice Survey measures from the third quarter of 2019 through the fourth quarter of 2019 and the third quarter of 2020 through the fourth quarter of 2021.

Entropy-Balancing and Covariate Balance

As discussed in Appendix C, our DD analyses weight each of three groups (pre-period Hospice-participating, pre-period nonparticipating, and post-period nonparticipating) beneficiaries to the post-period participating group. This section gives information on balance between the Hospice-participating and nonparticipating plans in our outcomes analyses.

In the interest of brevity, we do not present full balance tables for each outcome, but three sets of EB weights were fit for each primary outcome model presented in the Hospice section to account for any differences in population definitions and item nonresponse in the outcomes as displayed in Table M.3 for the hospice enrollment outcome. As with VBID General, we use SMDs as our primary measure of balance. In our case, we calculate the mean of a covariate among the post-VBID Hospice-participating group, subtract the weighted mean of one of the other groups (for example, pre-VBID Hospice-nonparticipating), and divide that difference by the SD of the covariate among post-VBID Hospice–participating individuals. Because the final DD estimate uses differences involving all combinations of pre- and post-VBID and participating- and nonparticipating, lack of balance for any of the three SMDs for a given covariate can lead to bias in the treatment effect estimate.

In general, it was difficult to achieve balance between the Hospice-participating and comparison groups. Two headwinds for these analyses were that (1) relatively few beneficiaries were in Hospice-participating plans (and relatively few plans were Hospice-participating) and (2)

the distribution of pre-treatment characteristics was very different between the participating and nonparticipating groups, perhaps driven by the fact that a majority of the Hospice-participating beneficiaries were in Puerto Rico. The relatively small number of participating beneficiaries reduces the statistical power relative to what would have been expected if the data had been better balanced between participating and nonparticipating plans, and the small number of participating plans makes balancing plan-level characteristics from the pre- to post-period difficult. Furthermore, because the of the strong differences in covariate distributions between the Hospice-participating and nonparticipating groups, it is difficult to achieve good balance between participating and nonparticipating plans.

Table M.3 provides an example. Achieving balance at the 0.1 or even 0.2 level of SMD was not numerically possible for the pre-VBID Hospice-participating group, so we allow for a margin of 0.3 for that set of weights for all of the primary outcomes. We are able to achieve somewhat better balance for pre- and post-VBID nonparticipating groups: Maximum SMDs were 0.25 and 0.2, respectively. Even given these relatively wide allowance for imbalance, the effective sample sizes are drastically lower than the nominal sample sizes, especially for the nonparticipating/pre-VBID group (Table M.4). As an example, for the Hospice enrollment outcome, the nominal sample size of over 506,000 enrollees is reduced to an effective sample size of 4,144. The reduction in effective sample size results in relatively wide confidence intervals (especially after accounting for plan-level fixed effects) which is formally accounted for in our main results. If it were possible to account for additional uncertainty because of the relatively large lingering imbalances after applying the EB weights, we would generally expect the CIs to be wider still, although the DD design will account for lingering imbalances if they are time-invariant. Balance summaries for other outcomes are available in Table M.5.

Table M.3. Descriptive Statistics of Balancing Variables for Hospice Enrollment

Variable (frequency, % unless otherwise noted)	Level	Hospice-Participating Group Post-VBID Mean	Comparison Group Pre-VBID SMD	Hospice-Participating Group Pre-VBID SMD	Comparison Group Post-VBID SMD
Area-level income	County	22,841	−0.15	−0.10	−0.06
MA penetration	County	63	0.14	0.30	0.03
Urbanicity	County	1.93	0.01	−0.14	0.14
HPSA	County	1.60	−0.14	−0.02	−0.11
Standardized Medicare costs per capita	County	9834	−0.25	−0.30	−0.20
% population > 65	County	17	−0.24	0.12	−0.20
Puerto Rico county	County	0.51	0.25	0.05	0.20
Social Deprivation Index	County	210	0.15	−0.02	0.06
% population that did not work, 16−64	County	0.41	0.16	0.04	0.08
% population aged >65, Black alone	County	1.92	0.19	−0.20	0.13

Variable (frequency, % unless otherwise noted)	Level	Hospice-Participating Group Post-VBID Mean	Comparison Group Pre-VBID SMD	Hospice-Participating Group Pre-VBID SMD	Comparison Group Post-VBID SMD
% Disabled 18−64, Civil Noninstitutionalized	County	13.73	0.16	0.11	0.05
% population Black, non-Hispanic	County	0.08	0.14	−0.30	0.09
Total (MAPD + PDP) LIS enrollees in 2021 as % total Medicare enrollment	County	0.11	−0.25	−0.21	−0.20
MAPD LIS enrollees in 2021 as % total Medicare enrollment	County	0.07	−0.14	−0.04	−0.19
Blue Cross and/or Blue Shield affiliate	PO	0.19	0.16	0.30	0.19
For-profit status	PO	0.83	−0.05	0.07	−0.01
MA penetration rate	PO	64	0.25	0.28	0.14
Median income	PO	21,792	−0.24	−0.08	−0.20
PO enrollment	PO	1,227,520	0.13	0.04	−0.20
Star Rating (Overall)	Contract	4.05	−0.25	−0.30	0.12
Enrollment	PBP	28,159	0.06	0.30	0.07
Part C Cost to CMS	PBP	1062	−0.16	0.27	−0.16
Bids—MA	PBP	618	−0.01	0.30	−0.20
MA premiums	PBP	3.32	0.09	0.22	−0.02
$0 premium plan	PBP	0.16	−0.25	0.00	−0.13
Cost of MSB	PBP	56	0.25	0.30	0.06
Rebate dollars amount	PBP	192	0.25	0.30	−0.02
Administrative costs (bid data)	PBP	116	−0.25	−0.23	0.03
OOP maximum (Part C)	PBP	4103	0.18	0.30	0.01
PDSS participant	PBP	0.56	—	—	0.20
Type of plan	PBP				
SNP type (C-SNP, D-SNP, I-SNP)	PBP	0.03	−0.25	0.11	−0.05
No-bonus county	PBP	7.48	0.02	0.02	0.02
Single-bonus county	PBP	5.28	0.08	0.15	−0.07
Double-bonus county	PBP	87	−0.05	−0.08	0.02
Age	Beneficiary	80	0.06	−0.09	0.14
Sex	Beneficiary	0.49	0.02	0.04	−0.03
Black	Beneficiary	0.10	0.13	−0.18	0.07
Hispanic	Beneficiary	0.48	0.10	0.00	0.11
API	Beneficiary	0.05	0.13	0.07	0.13
AI/AN	Beneficiary	0.00	0.02	0.03	0.00
Multi-racial	Beneficiary	0.01	0.02	−0.05	0.01
White	Beneficiary	0.36	−0.25	0.09	−0.20
Dual	Beneficiary	0.39	−0.25	0.18	−0.20
LIS Status, level 1	Beneficiary	0.08	0.03	−0.06	−0.04
LIS, level 2	Beneficiary	0.03	−0.14	−0.08	0.01

Variable (frequency, % unless otherwise noted)	Level	Hospice-Participating Group Post-VBID Mean	Comparison Group Pre-VBID SMD	Hospice-Participating Group Pre-VBID SMD	Comparison Group Post-VBID SMD
LIS, level 3	Beneficiary	0.03	−0.19	−0.30	0.06
LIS, level 4	Beneficiary	0.01	−0.01	0.00	−0.04
Disabled	Beneficiary	0.27	−0.01	0.04	−0.05
ESRD	Beneficiary	0.01	0.05	0.08	0.04
HCC score	Beneficiary	2.46	−0.22	−0.10	−0.08
Date of death (day of year)	Beneficiary	185	0.00	0.02	0.04
Number of months continuously enrolled in the plan (in the pre-12 months) that is anchored at death date (whether it is FFS or MA)	Beneficiary	11	0.07	0.30	−0.03
Proportion of people who died while receiving hospice care among all deaths	HRR	48	−0.25	−0.05	−0.04

SOURCE: RAND analysis of CMS and other data.
NOTE: HRR = hospital referral region. Balance measures are calculated after EB weights have been applied.

Table M.4. Effective Sample Sizes Due to Application of Entropy-Balancing Weights

Outcome measure	Hospice-Participating Group Post-VBID Nominal *N*	Comparison Group Pre-VBID ESS (nominal *N*)	Hospice-Participating Group Pre-VBID ESS (nominal *N*)	Comparison Group Post-VBID ESS (nominal *N*)
Hospice enrollment in the year of death	23,750	4,144 (506,528)	5,501 (19,261)	16,468 (690,679)
Length of final episode of hospice care (days)	8,227	3,447 (263,029)	3,556 (7416)	8,387 (317,059)
Professional visits in at least two of last three days of life	6,894	2,549 (177,958)	2,695 (6156)	6,142 (222,263)
Summary CAHPS Hospice Survey score	1,677	1,182 (65,785)	805 (1827)	2,410 (69,650)
Any live discharges from hospice	11,216	3,920 (327,763)	4,301 (9864)	10,207 (398,701)
Death within 30 days of a live discharge	1,725	520 (47863)	471 (1899)	1,323 (50972)
Transfer to another hospice within seven days of a live discharge	1,725	520 (47863)	471 (1899)	1,323 (50972)

SOURCE: RAND analysis of CMS and other data.

Table M.5. Measures of Imbalance Following Application of Entropy-Balancing Weights

Outcome Measure	Mean ESS	Max ESS	Count of Covariates with ESS Above 0.1	Count of Covariates with ESS Above 0.2
Hospice enrollment in the year of death	0.126	0.30	88	42
Length of final episode of hospice care (days)	0.12	0.30	84	43
Professional visits in at least two of last three days of life	0.122	0.30	83	45
Summary CAHPS Hospice Survey score	0.092	0.30	115	47
Any live discharges from hospice	0.124	0.30	88	42
Transfer from hospice in the given year	0.124	0.30	88	42
Revocation in the given year	0.124	0.30	88	42
Death within 30 days of a live discharge	0.138	0.30	100	45
Transfer to another hospice within seven days of a live discharge	0.138	0.30	100	45

SOURCE: RAND analysis of CMS and other data.

Outcome Summaries

Table M.6 summarizes our primary outcomes, both with and without weights. (Because the 2021 VBID Hospice-participating group is our target, no weights are applied to that group.) We see that—especially prior to weighting—there are substantial differences between the Hospice-participating and comparison groups at baseline. For example, approximately 41% of decedents in the Hospice-participating group enrolled in hospice in the year of their death, compared with 53% in the nonparticipating comparison group in that same year. The differences are generally reduced after weights are applied, but substantial differences remain at baseline, meaning that we do rely on DD to resolve any lingering imbalances (whether because of observed or unobserved characteristics) between the participating and comparison groups.

Next, Table M.7 reports our DD estimates of the association between changes in our outcomes of interest and the Hospice Benefit component. Even though there are some relatively large differences in weighted outcomes in 2021 in Table M.5, only one of the associated *p*-values is below 0.05 (CAHPS Hospice Survey summary score; $p = 0.02$, 95% CI: 0.39 to 4.79). Because of the relatively low effective sample sizes, many of the nonsignificant estimates have CIs that include values that correspond to meaningful policy effects, so we are not able to rule out meaningful effects of Hospice Benefit component participation.

Table M.6. Unweighted and Weighted Outcomes of Interest for Hospice Benefit Component Participants and Comparison POs, Mean (Standard Deviation)

Outcome	Participating, 2021	Comparison, 2019, Weighted	Participating, 2019, Weighted	Comparison, 2021, Weighted	Comparison, 2019, Unweighted	Participating, 2019, Unweighted	Comparison, 2021, Unweighted
Hospice enrollment in the year of death	0.38 (0.48)	0.44 (0.11)	0.40 (0.54)	0.40 (0.09)	0.53 (0.50)	0.41 (0.49)	0.47 (0.50)
Length of final episode of hospice care (days)	75.21 (1.67)	68.00 (0.26)	72.70 (1.78)	65.97 (0.24)	64.19 (134.89)	74.89 (155.52)	64.79 (143.74)
Final LOS less than three days	0.10 (0.00)	0.09 (0.00)	0.08 (0.00)	0.11 (0.00)	0.12 (0.32)	0.08 (0.27)	0.13 (0.34)
Final LOS less than seven days	0.28 (0.00)	0.27 (0.00)	0.26 (0.01)	0.30 (0.00)	0.32 (0.47)	0.25 (0.43)	0.34 (0.47)
Final LOS more than 180 days	0.12 (0.00)	0.11 (0.00)	0.11 (0.00)	0.10 (0.00)	0.10 (0.30)	0.11 (0.31)	0.10 (0.30)
Professional visits in at least two of last three days of life	0.58 (0.01)	0.63 (0.00)	0.59 (0.01)	0.63 (0.00)	0.66 (0.47)	0.60 (0.49)	0.64 (0.48)
Summary CAHPS Hospice Survey score	80.36 (0.53)	81.84 (0.08)	79.12 (0.53)	80.63 (0.08)	81.65 (20.52)	80.33 (21.45)	81.43 (21.24)
Any live discharges from hospice	0.13 (0.00)	0.16 (0.00)	0.16 (0.00)	0.14 (0.00)	0.12 (0.33)	0.15 (0.36)	0.11 (0.32)
Transfer	0.02 (0.00)	0.02 (0.00)	0.02 (0.00)	0.02 (0.00)	0.02 (0.14)	0.02 (0.14)	0.02 (0.13)
Revocation	0.06 (0.00)	0.07 (0.00)	0.07 (0.00)	0.06 (0.00)	0.06 (0.23)	0.07 (0.25)	0.06 (0.23)
Death within 30 days of a live discharge	0.07 (0.01)	0.13 (0.00)	0.09 (0.01)	0.10 (0.00)	0.16 (0.37)	0.10 (0.30)	0.14 (0.34)
Transfer to another hospice within seven days of a live discharge	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.03)	0.00 (0.03)	0.00 (0.02)

SOURCE: RAND analysis of CMS and other data.
NOTE: All outcomes are at the beneficiary level. Comparison participants include beneficiaries from comparison plans and beneficiaries from VBID-participating POs that are not participating in the Hospice Benefit component.

Table M.7. Outcomes of Entropy Balanced DD Models for Hospice Benefit Component

Outcome (frequency, % unless otherwise noted)	Estimate	Bootstrap Standard Error	95% CI Lower Bound	95% CI Upper Bound	*p*-value
Hospice enrollment in the year of death	−0.002	0.009	−0.02	0.02	0.855
Length of final episode of hospice care (days)	0.78	3.70	−6.48	8.04	0.834
Final LOS less than three days	−0.00	0.01	−0.02	0.01	0.543
Final LOS less than seven days	−0.01	0.01	−0.03	0.02	0.578
Final LOS more than 180 days	0.01	0.01	−0.01	0.03	0.415
Professional visits in at least two of last three days of life	−0.02	0.02	−0.05	0.02	0.320
Summary CAHPS Hospice Survey score	2.59	1.12	0.39	4.79	0.021
Any live discharges from hospice	−0.02	0.01	−0.03	0.00	0.097
Transfer	0.00	0.00	−0.00	0.01	0.208
Revocation	−0.01	0.01	−0.02	0.00	0.204
Death within 30 days of a live discharge	0.01	0.02	−0.03	0.05	0.606
Transfer to another hospice within seven days of a live discharge	0.00	0.00	−0.00	0.00	0.841

SOURCE: RAND analysis of CMS and other data.
NOTE: In addition to balancing, models controlled for plan-level fixed effects.

Sensitivity Analyses

Finally, we also performed sensitivity analyses that examined unweighted DD estimates calculated separately for important sub-populations within our data. For each of our primary Hospice outcomes, we estimate the DD association for all beneficiaries; beneficiaries in Puerto Rico and not in Puerto Rico; white, Black, and Hispanic beneficiaries; beneficiaries living in urban and not urban locations; and beneficiaries in D-SNPs and not in D-SNPs. For each of these sets of beneficiaries, we estimate DD models that account for plan-level fixed effects but that include no EB weights or other control variables, both because it is not possible numerically to weight on the full set of covariates for each subset and to assess whether the null main results might primarily reflect reduced effective sample sizes because of high variability among the weights. A Bonferroni correction for multiple comparisons—which accounts for the fact that when we perform many hypothesis tests without adjustment, we expect some to appear significant by random chance alone—requires $p < 0.0007$ to be statistically significant at the standard 0.05 level of significance. Out of these outcome and sub-population combinations, we only find statistically significant associations for hospice enrollment in the year of death for Hispanic beneficiaries and not urban beneficiaries (data not shown). Because these sensitivity analyses do not incorporate reduced effective sample size that results from application of EB weights, the mostly null sensitivity analyses align with our main findings that we have little evidence that the Hospice Benefit component affects our primary outcomes.

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