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SAMPLE
2018-2020 Cohort 21

MEDICARE ADVANTAGE ORGANIZATION

PERFORMANCE MEASUREMENT REPORT

MEDICARE HEALTH OUTCOMES SURVEY

CENTERS FOR MEDICARE & MEDICAID SERVICES

HEALTH SERVICES ADVISORY GROUP

DEPARTMENT OF HEALTH & HUMAN SERVICES
Centers for Medicare & Medicaid Services
7500 Security Boulevard
Baltimore, Maryland 21244-1850

CENTER FOR MEDICARE

July 2021

Medicare Advantage Organizations,

The Centers for Medicare & Medicaid Services (CMS) is pleased to provide you with your Medicare Advantage Organization's (MAO) performance measurement results for *2018-2020 Cohort 21* of the Medicare Health Outcomes Survey (HOS). The *2018-2020 Cohort 21 Performance Measurement* Report includes results from the Medicare HOS Version 3.0. The report presents performance measurement results for MAOs based on data from the Medicare HOS *2018 Cohort 21 Baseline* and *2020 Cohort 21 Follow Up* surveys describing changes in health status over time for beneficiaries. CMS encourages MAOs to examine their results for use in quality improvement activities.

The Performance Measurement Report is distributed to help MAOs understand and find their HOS results for key health indicators. Information on the HOS measures used in the Medicare Star Ratings, as well as additional resources to assist MAOs in their quality improvement efforts, is included in the report. The *2018-2020 Cohort 21 Performance Measurement* Report also includes a Reader's Guide, HOS Highlights, as well as trend information over recent years for your individual MAO.

For more program information, you may submit inquiries to hos@hsag.com or contact Health Services Advisory Group (HSAG) through the HOS Information and Technical Support telephone line at (888) 880-0077, and you may visit the CMS HOS website at www.cms.gov/Research-Statistics-Data-and-Systems/Research/HOS/index.html.

Sincerely,

Elizabeth Goldstein, PhD
Director
Division of Consumer Assessment & Plan Performance

MEDICARE HEALTH OUTCOMES SURVEY
SAMPLE MAO REPORT

The following is a **sample** version of the *Cohort 21* Performance Measurement Report made available to all Medicare Advantage Organizations (MAOs) participating in the *2018 Cohort 21 Baseline* and *2020 Cohort 21 Follow Up* Medicare Health Outcomes Surveys.

The figures, tables, and text in this document contain example MAO and state level data; however, all references to the *HOS Total* reflect **actual** data.

The Medicare HOS Information and Technical Support Telephone Line (1-888-880-0077), as well as the HOS email address (*hos@hsag.com*), are available to provide assistance with report questions and interpretation. A full description of the HOS program may be found at *www.hosonline.org*.

Table of Contents

Executive Summary

This Medicare Health Outcomes Survey (HOS) *2018-2020 Cohort 21 Performance Measurement* Report presents aggregate results for participating Medicare Advantage Organizations (MAOs), as well as specific results for MAO HXXXA based on data from the HOS *2018 Cohort 21 Baseline* and *2020 Cohort 21 Follow Up* surveys. This report includes data for consolidating contracts where applicable, and therefore includes results for HXXXA.

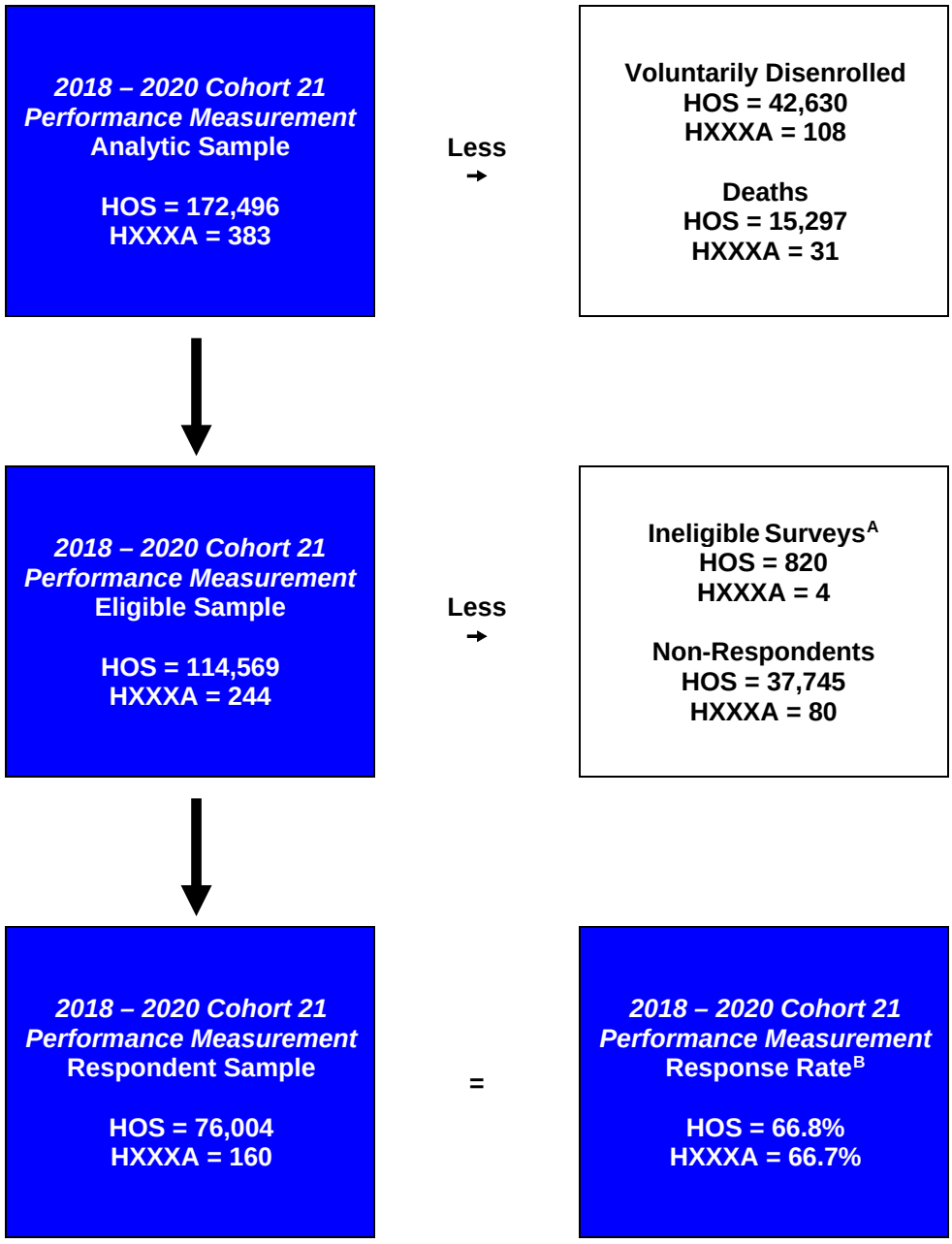
The HOS performance measurement results describe change in health status over time for beneficiaries. The *2018 Cohort 21 Baseline* included a random sample of 542,238 Medicare beneficiaries, both the aged and disabled, enrolled in 465 MAOs. Of the eligible 530,569 individuals sampled, 40.9% (217,255) completed the baseline survey. A completed survey was defined as one that could be used to calculate a physical component summary (PCS) or mental component summary (MCS) score. Of the 217,255 respondents, 181,013 seniors (adults age 65 or older) returned a completed survey. During the two years between the baseline and follow up surveys, 36 participating MAOs discontinued offering managed care to Medicare beneficiaries or consolidated with other MAOs. As a result of these changes, there remained 172,496 baseline respondents in 429 contract reporting units (MAOs). This group of 172,496 seniors comprises the *Cohort 21 Performance Measurement* analytic sample.

At the time of follow up, 114,569 beneficiaries in the *Cohort 21 Performance Measurement* analytic sample were still enrolled in their original MAO. These beneficiaries are referred to as the *Cohort 21 Performance Measurement* eligible sample since they were alive and eligible for remeasurement. After removing 820 beneficiaries who were determined to be ineligible at follow up, 113,749 beneficiaries remained. A total of 76,004 beneficiaries returned a follow up survey with a calculable PCS or MCS score, yielding a follow up response rate of 66.8%. These 76,004 beneficiaries comprise the *Cohort 21 Performance Measurement* respondent sample. Figure 1 on the following page depicts the distribution of the sample and the response rates for the national HOS sample and your MAO.

On the following pages of this Executive Summary, the results for MAO HXXXA, StateXX, and the HOS Total respondent sample across key indicators of beneficiary health status are found. The primary physical and mental health results are included, as well as trend results for the current and previous two cohorts. The Executive Summary also provides the distribution of beneficiary responses at baseline and follow up for general and comparative health, chronic medical conditions, healthy days, and obesity measures. More detailed information about the results is provided in the *Cohort 21 Performance Measurement* Results section of the report. For MAOs with a small number of respondents, caution should be exercised when drawing conclusions from the results throughout this follow up report.

State level statistics in figures and tables are *not applicable* (NA) for Regional Preferred Provider Organization (RPPO) and Private Fee-for-Service (PFFS) contracts. For reporting purposes, these types of plans are not included in any specific state results; however, they are included in the HOS Total results.

Figure 1: Distribution of the Performance Measurement Sample and Response Rates for HOS Total and MAO HXXXA



[A] Beneficiaries with ineligible surveys at follow up met one of the following criteria: not enrolled in the MAO; bad address and phone number; or language barrier.
[B] Response Rate = [Respondent Sample/(Eligible Sample-Ineligible Surveys)] x 100%.

HOS Performance Measurement Results

The HOS national average, also referred to in this report as the HOS Total, is based on all MAOs that participated in the performance measurement. Outliers are those MAOs that performed significantly better or significantly worse than expected when compared to the national average. MAOs may be outliers on a measure of physical health, mental health, or both. The overall measure of change in physical health is calculated by combining death status and the PCS score. Change in mental health is calculated using the MCS score.

For the *2018-2020 Cohort 21 Performance Measurement*, a statistical assessment of the case-mix adjusted results for mortality and PCS findings revealed that at the national level, MAOs differed significantly on the mortality measure but did not differ significantly on the PCS measure. Based on the PCS findings, all plans fell into the "same as expected" designation. For MCS, statistical assessment of the case-mix adjusted results revealed 28 outlier MAOs. There were 9 outlier MAOs that performed "better than expected" and 19 outlier MAOs that performed "worse than expected" compared to the national average. Additional performance measurement results and details are provided in Tables 1 and 2 below and in the *Cohort 21 Performance Measurement* Results section.

Trends in Performance Measurement Results for MAO HXXXA

Table 1 presents the trends in the physical health performance measurement results for your MAO. The current cohort results are provided, and when available, results for the past two cohorts are also shown for comparison. The Medicare Star Ratings measure for *Improving or Maintaining Physical Health* is derived from the combined "Percent Better+Same" result in Table 1. More information about this measure and the Medicare Star Ratings is found in the HOS and the Star Ratings section in this report.

Table 1: Trends in Physical Health Results over Three Cohorts for MAO HXXXA

	Percent Better*	Percent Same*	Percent Worse*	Percent Better+Same*	Performance Results**
2018-2020 Cohort 21	17.18%	52.57%	30.25%	69.75%	⇔
2017-2019 Cohort 20	17.07%	51.60%	31.33%	68.67%	⇔
2016-2018 Cohort 19	17.46%	51.64%	30.90%	69.10%	⇔

NA indicates that the MAO did not have results for the specified cohort.

* The percent better, same, worse, or better+same refers to beneficiary health status within an MAO.

** The statistical significance of each performance result for the MAO is indicated by one of the following symbols:

⬆ MAO performed significantly better than expected (higher than the national average)

⬇ MAO performed significantly worse than expected (lower than the national average)

⇔ MAO performed as expected (the same as the national average)

Table 2 below presents the trends in the mental health performance measurement results for your MAO. Results for the current cohort are displayed, and when available, results for the past two cohorts are also shown. The Medicare Star Ratings measure for *Improving or Maintaining Mental Health* is the combined "Percent Better+Same" result in Table 2.

Table 2: Trends in Mental Health Results over Three Cohorts for MAO HXXXA

	Percent Better*	Percent Same*	Percent Worse*	Percent Better+Same*	Performance Results**
2018-2020 Cohort 21	15.23%	63.68%	21.09%	78.91%	⇔
2017-2019 Cohort 20	15.14%	67.70%	17.16%	82.84%	⇔
2016-2018 Cohort 19	15.90%	65.69%	18.41%	81.59%	⇔

NA indicates that the MAO did not have results for the specified cohort.

* The percent better, same, worse, or better+same refers to beneficiary health status within an MAO.

** The statistical significance of each performance result for the MAO is indicated by one of the following symbols:

⬆ MAO performed significantly better than expected (higher than the national average)

⬇ MAO performed significantly worse than expected (lower than the national average)

⇔ MAO performed as expected (the same as the national average)

Health Status Summary for MAO HXXXA

The following health status indicators are displayed as a resource to assist MAOs in their quality improvement efforts by emphasizing areas where beneficiaries may be doing poorly. Data from these measures are not included in the Medicare Star Ratings.

General Health and Comparative Health

Table 3 describes baseline and follow up results for the general and comparative health status of beneficiaries in MAO HXXXA, StateXX, and the HOS Total. Populations with greater increases between baseline and follow up in the proportion of beneficiaries who indicated that their *general health* was "Fair" or "Poor" or that their *physical* or *mental health compared to one year ago* was "Slightly worse" or "Much worse" may assume greater risk for mortality.[1,2]

Table 3: *2018-2020 Cohort 21 Performance Measurement* Distributions of Beneficiaries with Worse Self-Rated General and Comparative Health Status for MAO HXXXA, StateXX, and HOS Total

	General Health Fair or Poor		Comparative Physical Slightly Worse or Much Worse		Comparative Mental Slightly Worse or Much Worse	
	Baseline	Follow Up	Baseline	Follow Up	Baseline	Follow Up
HXXXA	21.4%	21.5%	23.1%	21.7%	9.0%	16.0%
StateXX	21.8%	25.7%	22.1%	28.4%	9.7%	17.1%
HOS Total	22.5%	24.9%	22.6%	26.8%	10.0%	16.0%

Chronic Medical Conditions

Table 4 shows the percentage of beneficiaries with multiple (i.e., two or more) chronic medical conditions at baseline and follow up for MAO HXXXA, StateXX, and the HOS Total. Research demonstrates that having a greater number of chronic conditions increases the risks of the following outcomes: mortality, poor functional status, unnecessary hospitalizations, adverse drug events, duplicative tests, and conflicting medical advice.[3] It may be useful to compare the relative differences in the results from baseline to follow up for MAO HXXXA, StateXX, and the HOS Total.

Table 4: *2018-2020 Cohort 21 Performance Measurement* Distribution of Beneficiaries with Multiple Chronic Medical Conditions§ for MAO HXXXA, StateXX, and HOS Total

	Multiple Chronic Medical Conditions§	
	Baseline	Follow Up
HXXXA	70.9%	76.6%
StateXX	74.4%	79.1%
HOS Total	75.2%	77.5%

§ Multiple chronic medical conditions are defined as having two or more conditions.

Healthy Days Measures

Table 5 shows the percentages of beneficiaries in MAO HXXXA, StateXX, and the HOS Total with 14 or more days of poor *physical health*, *mental health*, or *activity limitations in the past 30 days*. In general, 14 or more days of poor physical health, mental health, or activity limitations are considered indicative of poor well-being.[4] Healthy Days Measures serve as indicators of populations with greater risk for disease or injury. MAOs may use responses to Healthy Days Measures to identify beneficiaries in poor health who may have undiagnosed conditions or are having difficulty managing stress or chronic diseases. It may be useful to compare the relative differences in the results for MAO HXXXA, StateXX, and the HOS Total.

Table 5: *2018-2020 Cohort 21 Performance Measurement* Distribution of Beneficiaries with Worse Health for the Healthy Days Measures for MAO HXXXA, StateXX, and HOS Total

	14 or More Days of Poor Physical Health		14 or More Days of Poor Mental Health		14 or More Days of Activity Limitations	
	Baseline	Follow Up	Baseline	Follow Up	Baseline	Follow Up
HXXXA	17.6%	10.4%	11.6%	7.1%	12.8%	9.4%
StateXX	15.8%	17.4%	10.2%	10.1%	10.9%	11.4%
HOS Total	16.9%	17.9%	9.3%	10.8%	11.3%	12.7%

Clinical Measures

Table 6 illustrates the distribution of underweight, overweight, and obese beneficiaries across baseline and follow up for MAO HXXXA, StateXX, and the HOS Total. These Body Mass Index (BMI) categories are considered unhealthy and are associated with increased chronic diseases, and in the case of the underweight, increased mortality for the elderly. It may be useful to compare the proportion of beneficiaries who are in these unhealthy BMI categories for MAO HXXXA, StateXX, and the HOS Total.

Table 6: *2018-2020 Cohort 21 Performance Measurement* Distribution of Beneficiaries in Extreme Categories of the BMI Measures for MAO HXXXA, StateXX, and HOS Total

	Underweight (BMI < 18.5)		Overweight (BMI 25 to 29.99)		Obese (BMI ≥ 30)	
	Baseline	Follow Up	Baseline	Follow Up	Baseline	Follow Up
HXXXA	0.7%	0.0%	34.9%	32.9%	34.9%	34.2%
StateXX	1.6%	2.3%	36.4%	32.8%	32.1%	31.4%
HOS Total	1.6%	2.3%	38.1%	36.9%	31.6%	30.2%

Note: BMI categories were modified beginning with the *2017 Cohort 20 Baseline* Report. Underweight was changed from "<20" to "<18.5."

Reader's Guide

The Reader's Guide is provided to assist MAOs in the use of information in their HOS Performance Measurement Report. This section will guide the reader in identifying key topics, such as the CMS Medicare Star Ratings, and will also answer general questions about the report and data. For further assistance, please refer to the Technical Assistance information below. Additionally, the HOS Highlights section of this report contains information about website content, webinars, and other HOS program updates.

Technical Assistance

The Medicare HOS Information and Technical Support Telephone Line (1-888-880-0077) and Email Address (hos@hsag.com) are available to provide assistance with report questions and interpretation. The CMS HOS website provides general information about the HOS program (www.cms.gov/Research-Statistics-Data-and-Systems/Research/HOS/index.html). A full description of the HOS program is available at www.HOSonline.org.

How to Use the Information in this Report

This report is designed to assist MAOs in identifying opportunities to reduce health disparities and explore potential programmatic interventions aimed at maintaining or improving the overall health of their Medicare population. Health status indicators are displayed within demographic groups to emphasize where beneficiaries are doing poorly. This detail is included to help plans identify potential areas for further investigation.

What information can I find in this Performance Measurement Report?
The results for key health indicators derived from the cohort of beneficiaries at baseline and the two-year follow up are provided in this report. Please refer to the description of each report section below and to the Table of Contents for the specific section pages.

- **HOS Highlights:** introduces new and updated HOS program information, self-paced training webinars, and website resources for MAOs and other data users.
- **HOS and the Star Ratings:** discusses the HOS measures currently used by CMS for the Medicare Star Ratings. Three HOS measures are reported in the new HEDIS HOS Effectiveness of Care Report and two HOS measures are reported in the HOS Performance Measurement Report.
- ***Cohort 21* Distribution of the Sample and Response Rates**: summarizes the number of participating beneficiaries and the response rates at the MAO and national levels.
- ***Cohort 21 Performance Measurement* Results:** provides detailed result tables for the primary physical and mental health outcomes measures and other health indicators. Data estimates are provided to the second decimal place for the change score measures (better, same, and worse results) as these estimates are used in the Medicare Star Ratings. This section also provides demographic tables with values highlighted in **red** to indicate sub-groups that are worse off at follow up compared to their baseline. Question numbers in

the measure definitions are from the 2020 HOS 3.0 at follow up and may differ from those in the 2018 HOS 3.0 at baseline.

- **Appendix 1:** describes the program, the questions used in the calculation of physical component summary (PCS) and mental component summary (MCS) scores, and the case-mix adjusted outcomes for the performance measurement results.

- **Appendix 2:** includes information about the HOS Partners involved in the survey management, instrument design, sampling, administration, report production, and research activities.

- **References:** lists journal articles, technical reports, and website references that are provided throughout the report.

Where can I find additional HOS Program information, such as sampling methodology, and timelines for the reporting and data distribution?
An overview of the HOS Program, the sampling schedule, and program timelines are available on the Program page of the HOS website at www.HOSonline.org. A table with MAO report and data distribution dates is provided on the Data page of the website.

Are HOS measures part of the CMS Medicare Star Ratings?
HOS measures are included in the Medicare Star Ratings, which CMS developed to provide consumer information about MAOs and to reward high-performing health plans. CMS displays MAO information in the Medicare Plan Finder (MPF) tool on the www.medicare.gov/plan-compare website and awards quality bonus payments to the high-performing health plans. For information about the Star Ratings, refer to the HOS and the Star Ratings section in this report.

How are the Performance Measurement Reports distributed?
All reports are distributed electronically to participating MAOs through the CMS Health Plan Management System (HPMS), which requires an HPMS User ID. Downloads of the MAO report include summary-level data in a CSV file that contains contract-level survey responses, demographic data, the two HOS functional health measures from the Medicare Star Ratings, and the PFADL display measure. New in this year's CSV file, intermediate results of case-mix adjusted PCS and MCS change scores and MAO death results are added to assist MAOs in understanding the measure calculations. Please visit the following CMS site for information on how to establish access to HPMS: www.cms.gov/Research-Statistics-Data-and-Systems/Computer-Data-and-Systems/HPMS/UserIDProcess.html. If assistance is required regarding HPMS access, contact CMS at hpms_access@cms.hhs.gov.

When will MAOs receive beneficiary level data for *Cohort 21 Performance Measurement*?
The merged baseline and follow up beneficiary level data will be distributed to MAOs in the Summer of 2021. MAOs are notified via HPMS about the availability of their merged data and how to request it.

What is the difference between the Performance Measurement report and the beneficiary level data file?
The Performance Measurement report provides analysis of the aggregate data gathered from MAO beneficiaries and presents results and overall findings for the MAO sample. The

beneficiary level data file provides the sample and survey data that were compiled for each individual surveyed in the MAO. After the HPMS memo is posted in the summer to announce availability of the report and data, it is important for MAOs to obtain and review their reports through HPMS and to request their beneficiary level data through the HOS Technical Support Email.

Where can I find overall survey results information for earlier HOS cohorts that can be compared to the information in this report?
The Survey Results section on the HOS website (www.HOSonline.org) provides a table depicting general status information at the national HOS level, including sample sizes, completed surveys, and response rates, for the baseline and follow up cohorts administered and reported to date. Participating MAOs may also access their earlier reports through HPMS.

Where can I find the 2020 NCQA HEDIS® Measure results?
The 2020 National Committee for Quality Assurance (NCQA) Healthcare Effectiveness Data and Information Set (HEDIS)[C] results are reported in the 2020 HEDIS HOS Effectiveness of Care Report (HEDIS HOS Report). The HEDIS HOS report is new in 2021 and will continue hereafter on an annual basis. Specific elements of the HEDIS measures are used for the Medicare Star Ratings. Information about the Medicare Star Ratings is also available in the HOS and the Star Ratings section of this report.

Need More Help?

- MAOs are encouraged to direct their questions to the HOS Technical Support Team at Health Services Advisory Group (HSAG) at hos@hsag.com.
- Information about peer-reviewed articles, technical reports, and manuals related to the HOS is available on the Resources page of the HOS website (www.HOSonline.org). Consult the Home page for a listing of new reports and general updates.
- A glossary consisting of definitions relevant to the Medicare HOS may be accessed from the "Glossary" link at the bottom of site webpages.
- The Medicare 2018 and 2020 HOS 3.0 questionnaires are found in the NCQA HEDIS 2018 and 2020, Volume 6: Specifications for the Medicare Health Outcomes Survey manuals.[5,6] The manuals are available from NCQA at www.ncqa.org/hedis/measures/hos. Copies of other HEDIS publications may be obtained by calling the NCQA Customer Support Telephone Line at 1-888-275-7585 or via NCQA's Publications Center (https://store.ncqa.org/).

[C] HEDIS is a registered trademark of the National Committee for Quality Assurance (NCQA).

HOS Highlights

Enhancement to the CSV file accompanying the Performance Measurement Report

Beginning with the HOS *2010-2012 Cohort 13 Performance Measurement* Report, the MAO summary-level CSV data file has included a range of aggregate information such as survey responses, demographic data, PCS and MCS scores, and since last year, PFADL scores. This year, the summary-level CSV file has been expanded to include an indicator for Hispanic ethnicity as well as intermediate measures used to derive the final MAO-level outcomes (Alive and PCS better or same; MCS better or same; death). The additional measure data provided may help MAOs better interpret the calculation of the final MAO-level outcomes. Exact replication of the final MAO-level Alive and PCS better or same results may not be possible because MAOs do not have access to records of disenrolled beneficiaries that are included in the case-mix adjustment for death, which is used for PCS results.

Physical Functioning Activities of Daily Living (PFADL) Display Measure

The longitudinal PFADL change score measure is part of the 2021 and 2022 display measures on the CMS website and the Health Plan Management System (HPMS). CMS may consider the measure for the Star Ratings in the future.

The PFADL is a longitudinal change score measure derived from the HOS. It measures, at the MAO contract level, the change over two years in the physical functioning of beneficiaries enrolled in MAO contracts and complements the measurement of physical health status. The PFADL change score can be interpreted as approximating the percent of function retained over two years by the average beneficiary in an MAO. The PFADL scale combines two VR-12 physical functioning questions (limitations in moderate activities and climbing stairs) with the six activities of daily living (ADL) questions to create a Likert-type scale. PFADL scale scores are created from responses to the baseline and the two-year follow-up questions. A more detailed methodology used to create the PFADL change score measure is described on the Survey Results page of the HOS website (www.HOSonline.org).

Implementation of HOS 3.0

The 2020 survey administration used the HOS 3.0 that was implemented in 2015. The HOS 3.0 uses the Veterans RAND 12-Item Health Survey (VR-12) as the core physical and mental health outcomes measures, and the four HEDIS Effectiveness of Care measures are *Management of Urinary Incontinence in Older Adults, Physical Activity in Older Adults, Fall Risk Management,* and *Osteoporosis Testing in Older Women*. The HOS survey instruments are available on NCQA's website at www.ncqa.org/hedis/measures/hos.

HOS Website

The HOS website is a resource that provides:

- Historical overview of the project
- Updates on project activities
- Reports of ongoing research efforts
- Access to public use files and supporting documentation
- Clearinghouse of electronic information about journal articles, bibliographies, and technical reports relating to the HOS
- Links to project partners

Semiannual HOS Newsletters

The HOS Newsletters include information about HOS products, services, and timelines; program updates; self-paced training programs; and other relevant topics, such as sharing of best practices and highlights of recent research. HOS Newsletters are circulated semiannually via email, in winter and summer, to MAO contacts and users of HOS technical support. HOS Newsletters are also posted on the HOS website. If you would like to receive the HOS Newsletters, contact the HOS Information and Technical Support team at hos@hsag.com.

Participating MAOs

The current MAO Performance Measurement Contract List can be downloaded from the Survey Results section on the Survey page of the HOS website (www.HOSonline.org).

CMS Approved Survey Vendors

The Survey Vendors section under the Program page of the HOS website provides an annual list of CMS approved survey vendors. Survey vendors are required to reapply for approval each year. There were three survey vendors approved to administer the HOS in 2020.

Frequently Asked Questions (FAQs)

The "FAQs" link at the bottom of site webpages (www.HOSonline.org) provides answers to frequently asked questions about the Medicare HOS. Examples are questions about where to find the current survey administration documents and HOS questionnaires, how MAOs may obtain their reports and data, and where to find quality improvement ideas. Information is also provided about the types of files available for researchers and how to obtain the files.

Self-Paced Training Webinars

A series of basic to advanced self-paced training webinars are available on the HOS website. The webinars run approximately 30 minutes in length and may be accessed at any time at the convenience of the user. To access the webinars, go to the Trainings section under the Resources page on the HOS website (www.HOSonline.org).

- **Introduction to the Medicare Health Outcomes Survey (HOS):** A basic training session appropriate for MAOs that are new to the HOS or others seeking to obtain an overview of the HOS. In addition, the introductory training program provides some practical guidance about how to obtain HOS reports and data.
- **Getting the Most from Your Medicare Health Outcomes Survey (HOS) Baseline Report:** An intermediate training session that builds on the information from the basic tutorial described above. The training discusses maximizing the use of the HOS Baseline Report to provide information on the health of beneficiaries and incorporating chronic care improvement programs (CCIPs) in quality improvement activities.
- **Using Your Medicare Health Outcomes Survey (HOS) Data:** An intermediate training session assisting MAOs with using their HOS data to identify priorities and assess the impact of interventions. It also demonstrates the advantages of linking HOS data with your own MAO data.
- **Understanding the Medicare Health Outcomes Survey (HOS) Performance Results Used in the MA Plan Ratings:** An advanced training session describing the methodology used in calculating the Performance Measurement Results. The tutorial discusses the primary health outcomes collected from the survey, the PCS and MCS scores, and how they are used to describe changes in the functional status of MAO beneficiaries over a two-year period. It also discusses how the HOS results are used in the Medicare Advantage (MA) Plan Ratings, also called the Medicare Star Ratings.

Veterans RAND 12-Item Health Survey (VR-12) Website

Information about the VR-36, VR-12, and VR-6D instruments is available on the Boston University School of Public Health website. The website offers details on development, applications, and references for the VR-12, which is the core health outcomes measure in the Medicare HOS and HOS-M. For information about the instruments and to request permission to use the documentation and scoring algorithms, go to: www.bu.edu/sph/about/departments/health-law-policy-and-management/research/vr-36-vr-12-and-vr-6d.

HOS and the Star Ratings

Medicare Star Ratings

CMS developed the Medicare Star Ratings to help consumers compare health plans and the care and services they provide based on quality and performance, to make accurate data more transparent and standardized among plans, and to reward top-performing health plans. Consumers can use the Medicare Plan Finder (MPF) tool www.medicare.gov/plan-compare to search for health plans in their geographic area and compare cost estimates and coverage information. CMS rates the relative quality of service and care provided by MAOs based on a five-star rating scale that uses HOS measures combined with other measurement results. Up to 44 unique quality measures were included in the 2021 Medicare Part C and D Star Ratings. These measures include: providing preventive services, managing chronic illness, access to care, HEDIS measures, the Consumer Assessment of Healthcare Providers and Systems (CAHPS®) survey, and plan responsiveness.

The Medicare Part C Star Ratings include five contract level HOS measures: two measures of functional health and three HEDIS Effectiveness of Care measures.

The functional health measures are reported in each MAO's annual HOS Performance Measurement Report. The results are derived from the VR-12 portion of the HOS, which serves as the core source for the PCS and MCS scores. The final measures are based on the case-mix adjusted PCS and MCS change scores between baseline and follow up surveys, as well as death status, in the Performance Measurement Results section.

- *Improving or Maintaining Physical Health* measure is the "Physical Health Percent Better or Same" result
- *Improving or Maintaining Mental Health* measure is the "Mental Health Percent Better or Same" result

New in 2021, the HEDIS Effectiveness of Care measures are reported in each MAO's annual HEDIS HOS Effectiveness of Care Report. These measures are calculated from questions about information and care beneficiaries receive from their healthcare providers, using data for the baseline and follow up cohorts from the same measurement year (i.e., a round of data). Beneficiary responses are used to derive the HEDIS measures: Management of Urinary Incontinence in Older Adults, Physical Activity in Older Adults, Fall Risk Management, and Osteoporosis Testing in Older Women. CMS uses three components of these four measures for the Medicare Star Ratings. Further information is available in the HEDIS HOS Report.

- *Improving Bladder Control* measure is the Treatment of Urinary Incontinence rate
- *Monitoring Physical Activity* measure is the Advising Physical Activity rate
- *Reducing the Risk of Falling* measure is the Managing Fall Risk rate

2021 and 2022 Medicare Part C Star Ratings

The HOS cohorts related to data collection, report dissemination, and CMS Medicare Part C Star Ratings results are provided in the Medicare HOS Survey Administration Timeline Table below. This information will guide MAOs in understanding the sources of data used for specific Medicare Star Ratings measures.

The 2021 Medicare Part C Star Ratings were posted on October 8, 2020. Data sources for the 2021 Star Ratings are highlighted green in the table below. For instance, the HOS *2017-2019 Cohort 20 Merged Baseline* and *Follow Up* dataset was used for the two PCS and MCS functional health measures, and the combined *2019 Cohort 22 Baseline* and *2019 Cohort 20 Follow Up* dataset was used for the three HEDIS Effectiveness of Care measures.

The 2022 Medicare Part C Star Ratings will be posted in October 2021 and are highlighted yellow in the table below. The *2018-2020 Cohort 21 Merged Baseline* and *Follow Up* dataset will be used for the two PCS and MCS functional health measures, and the combined *2020 Cohort 23 Baseline* and *2020 Cohort 21 Follow Up* dataset will be used for the three HEDIS Effectiveness of Care measures.

Additional information about the Medicare Star Ratings can be found on the CMS website at https://go.cms.gov/partcanddstarratings. For any questions related to Medicare Part C and D Star Ratings, you may send an email inquiry directly to PartCandDStarRatings@cms.hhs.gov. Please be sure to include your contract number(s) in the email.

Medicare HOS Survey Administration and Star Ratings Timeline Table

Year	Baseline Data Collected	Follow Up Data Collected	Baseline Reports	Follow Up Reports	2-yr PCS/MCS Change for Star Ratings	HEDIS Measures for Star Ratings*	Star Rating Year
2023	*Cohort 26*	*Cohort 24*	*Cohort 25*	*Cohort 23*	*2019-2021 Cohort 22*	*2021 Cohort 24 Baseline & 2021 Cohort 22 Follow Up*	2023
2022	*Cohort 25*	*Cohort 23*	*Cohort 24*	*Cohort 22*	*2018-2020 Cohort 21*	*2020 Cohort 23 Baseline & 2020 Cohort 21 Follow Up*	2022
2021	*Cohort 24*	*Cohort 22*	*Cohort 23*	*Cohort 21*	*2017-2019 Cohort 20*	*2019 Cohort 22 Baseline & 2019 Cohort 20 Follow Up*	2021
2020	*Cohort 23*	*Cohort 21*	*Cohort 22*	*Cohort 20*	*2016-2018 Cohort 19*	*2018 Cohort 21 Baseline & 2018 Cohort 19 Follow Up*	2020
2019	*Cohort 22*	*Cohort 20*	*Cohort 21*	*Cohort 19*	*2015-2017 Cohort 18*	*2017 Cohort 20 Baseline & 2017 Cohort 18 Follow Up*	2019

* Four HEDIS Effectiveness of Care Measures collected by the HOS are calculated from the combined round of baseline and follow up data by reporting year: Management of Urinary Incontinence in Older Adults; Physical Activity in Older Adults; Fall Risk Management; and Osteoporosis Testing in Older Women. Beginning with the 2012 Star Ratings, the Osteoporosis Testing in Older Women measure was moved to the display measures on the CMS website where the 2020 result will be posted; this display measure will be retired in 2021.

MAO Resources for Best Practices and the Star Ratings

A study titled "Analysis of Key Drivers of Improving or Maintaining Medicare Health Outcomes Survey (HOS) Scores" is available on the HOS website at www.HOSonline.org.[7] The study describes how two-year mortality and two-year changes in the VR-12 items are associated with key HOS measures used in the Medicare Star Ratings. The HOS measures relate to maintaining and improving health and are derived from changes in the PCS and MCS scores. The results from this study clarify the properties of several CMS quality measures and identify which items most influence contract-level PCS and MCS scores.

A resource guide titled "Opportunities for Improving Medicare HOS Results through Practices in Quality Preventive Health Care for the Elderly" is available on the HOS website at www.HOSonline.org.[8] This guide is intended to help MAOs develop and apply strategies that address the HOS items used in the CMS Medicare Part C Star Ratings, including an overview of the HOS, national performance results on HOS items included in the Medicare Part C Star Ratings, best practices in promoting quality preventive health care for the elderly, and HOS resources available to MAOs. Section 1 discusses the prevalence of conditions measured by the HOS items and summarizes national HOS results to highlight opportunities for improvement and intervention strategies. Section 2 provides examples of interventions that some MAOs have used to promote patient/physician communication, screening services, or maintenance of functional status among their beneficiaries.

A companion literature review titled "Functional Status in Older Adults: Intervention Strategies for Impacting Patient Outcomes" is available on the HOS website at www.HOSonline.org.[9] This literature review synthesizes selected articles about functional status outcomes in older adults and supplements the resource guide. The articles include outcomes that target assessments of health from well-established questionnaires spanning the physical to psychological. In addition, outcome measures include ADLs that capture functional limitations in MA recipients. The articles were selected because they describe interventions that could impact functional status outcomes in elderly populations.

All three documents are available on the HOS website at www.HOSonline.org. The study results may be found and downloaded from the Applications section of the Resources page.

Cohort 21 Distribution of the Sample and Response Rates

The *Medicare HOS 2018 Cohort 21 Baseline* included a random sample of 542,238 beneficiaries, including both the aged and disabled, from 465 MAOs. Of the eligible 530,569 individuals sampled, 40.9% (217,255) completed the baseline survey. A completed survey was defined as one that could be used to calculate a PCS or MCS score. Of those 217,255 respondents, 181,013 seniors (adults age 65 or older) returned a completed survey. During the two years between the *2018 Cohort 21 Baseline* survey and the *2020 Cohort 21 Follow Up* survey, 36 MAOs discontinued offering managed care to Medicare beneficiaries or consolidated with other MAOs. As a result of these changes, 429 reporting units (MAOs), comprising 172,496 senior baseline respondents, remained in the HOS. For purposes of MAO comparisons, this group of 172,496 beneficiaries comprises the *Cohort 21 Performance Measurement* analytic sample.

The performance measurement results are based on the analytic sample of 172,496 seniors (see Figure 2) and not the entire population sampled at baseline and follow up. At the national level, 15,297 (8.9%) beneficiaries died between baseline and the two-year follow up. Another 42,630 (24.7%) beneficiaries voluntarily disenrolled from their MAOs during the same two-year period. The remaining 114,569 (66.4%) seniors were still alive and still enrolled in their original MAO at the time of follow up. These beneficiaries are referred to as the *Cohort 21 Performance Measurement* eligible sample. From the eligible sample, 820 beneficiaries were determined to be ineligible at follow up.[D] Of the remaining 113,749 beneficiaries, 37,745 did not respond and 76,004 returned a follow up survey that could be used to calculate a PCS or MCS score. These 76,004 seniors comprise the *Cohort 21 Performance Measurement* respondent sample, yielding a follow up response rate of 66.8%.[E]

Focusing on the 429 reporting units (MAOs) at follow up, the average number of respondents per MAO was 178, with a range of 1 to 682 respondents. Twenty-five percent of MAOs had 233 or more respondents, while 25% had 114 or less. Ten percent of the MAOs had 288 or more respondents, and 10% had 63 or fewer respondents. Based on the analytic criteria, the mean MAO level response rate at follow up was 65.1%, with a range of 14.5% to 83.9%. Twenty-five percent of MAOs had a response rate of 70.1% or greater, while 25% had a response rate of 61.6% or less. Ten percent of the MAOs had a response rate of 73.9% or higher, and 10% had a response rate of 56.4% or lower.

MAOs with a small number of respondents should exercise **caution** when drawing conclusions from the results as the sample size may be insufficient to allow meaningful interpretation.

[D] Ineligible beneficiaries at follow up met one of the following criteria: not enrolled in the MAO; bad address and phone number; or language barrier.

[E] The overall baseline and follow up response rates in the report are calculated after data processing and score calculation. Initial overall survey completion rates were calculated by NCQA following each data collection and used the criteria of at least 80% completion of survey items and all 6 ADL questions answered. These initial rates may be reported elsewhere and will differ from the overall response rates in this report.

MAO HXXXA

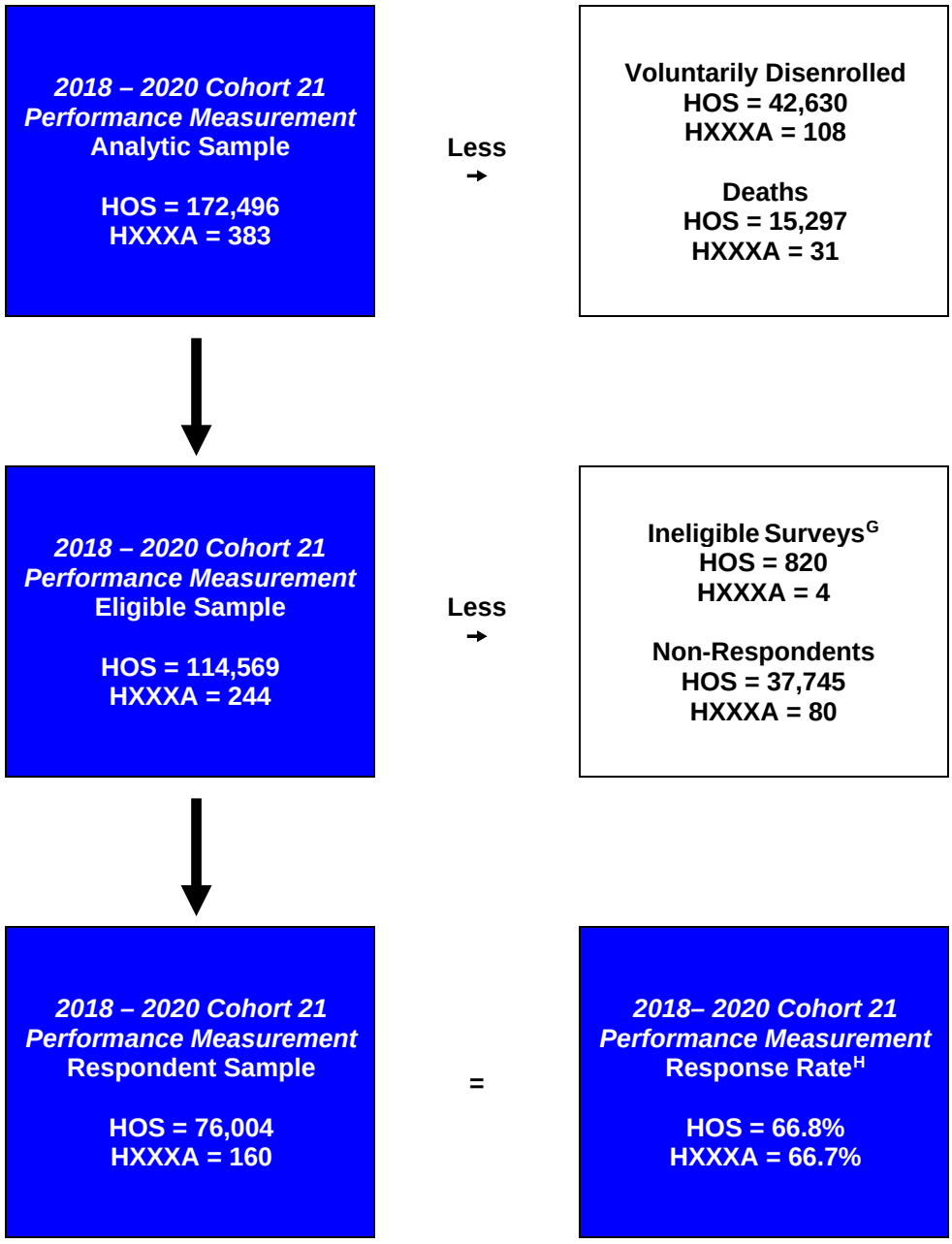
This report includes data for consolidating contracts where applicable, and therefore includes results for HXXXA.

The original baseline sample size for MAO HXXXA was 1,178; however, 795 beneficiaries were not included in the analytic sample because they did not complete the baseline survey, were not seniors, or were determined to be ineligible beneficiaries at baseline.[F] Therefore, your MAO's analytic sample size is 383. Of the 383 beneficiaries in your MAO's analytic sample, 108 voluntarily disenrolled from your MAO and 31 died between baseline and follow up. Of the 244 beneficiaries sent a follow up survey, 4 were determined to be ineligible. Of the remaining 240 beneficiaries, there were 80 who did not complete the survey and 160 who returned a completed follow up survey. This represented an overall follow up response rate of 66.7% for your MAO, as compared with the HOS follow up response rate of 66.8%.

On the following page, Figure 2 presents the Distribution of the Performance Measurement Sample and Response Rates for the HOS Total, as well as for MAO HXXXA.

[F] Ineligible beneficiaries at baseline met one of the following criteria: deceased; not enrolled in the MAO; bad address and phone number; a language barrier, or were removed from sample due to age less than 18 years.

Figure 2: Distribution of the Performance Measurement Sample and Response Rates for HOS Total and MAO HXXXA



[G] Beneficiaries with ineligible surveys at follow up met one of the following criteria: not enrolled in the MAO; bad address and phone number; or language barrier.
[H] Response Rate = [Respondent Sample/(Eligible Sample-Ineligible Surveys)] x 100%.

Cohort 21 Performance Measurement Results

The HOS *2018-2020 Cohort 21 Performance Measurement* results describe change in health status over time for beneficiaries in MAO HXXXA. Health outcomes are assessed for a randomly selected set of beneficiaries from each participating MAO contract over a two-year interval, with a baseline measure and a two-year follow up. In general, functional health status, as measured by the PCS score, is expected to decline over time in older age groups, while mental health status, as measured by the MCS score, may decline at a slower rate. The presence of one or more chronic medical conditions is associated with declines in both scores.[10] Though individual health status outcomes depend on individual medical care and personal circumstances, MAO performance may change over time, and is reported in the performance measurement results.

Case-mix variables of baseline demographics and health status as well as selected survey design variables are risk adjusted to make equitable health outcome comparisons across MAOs.[5] Risk-adjustment is a statistical technique that adjusts for variations in patient outcomes that stem from differences in existing patient characteristics rather than differences in performance between MAOs. The risk-adjusted outcomes are aggregated for the respondents in your MAO, and yield the MAO level performance measurement results.

The performance measurement analysis compares the percentages of beneficiaries in the MAO who are better, the same, or worse than expected at the two-year follow up to the national averages for both physical and mental health. Death and PCS scores are combined into one overall measure of change in physical health, while mental health is measured by MCS scores alone. There are six main categories of actual health outcomes used in the performance measurement analysis:

1. Alive and physical health better
2. Alive and physical health the same
3. Dead or physical health worse
4. Mental health better
5. Mental health the same
6. Mental health worse

The beneficiary samples for the performance measurement analysis include the sample of baseline respondents, which is used to calculate the MAO death rate, and the sample of baseline respondents that completed the follow up survey, which is used to create the final adjusted change scores.

- Beneficiaries who were age 65 or older and completed the HOS at baseline with a calculable PCS or MCS score were included in the analysis of the two-year death rate for MAOs that were still participating at follow-up.

- Beneficiaries were included in the analysis of PCS and MCS change scores if they were age 65 or older at baseline, enrolled in their original MAO at the time of follow up

sampling, and completed the HOS baseline and follow up surveys with a calculable PCS or MCS change score.

Beneficiary level results were aggregated to derive the MAO and HOS national percentage values. The HOS national average is based on all MAOs that participated in performance measurement. Outliers are those MAOs that performed significantly better or significantly worse than expected when compared with the national average. MAOs may be outliers on a measure of physical health or on a measure of mental health. An MAO that differed from the HOS national average by less than ± 2 standard deviations over the two-year period (based on case-mix adjusted results) is performing the same as expected. An MAO that had a significantly *higher* proportion of beneficiaries whose health remained stable or improved (Alive and PCS better or same; MCS better or same) over the two-year period is a positive outlier. An MAO that had a significantly *lower* proportion of beneficiaries whose health improved or remained stable over the two-year period is a negative outlier. For detailed information on the calculation of performance measurement results, see Appendix 1.

Physical Health

Performance measurement results for physical health combine risk-adjusted two-year mortality rates and changes in PCS scores for the primary physical health outcome (Alive and PCS better or same). Over the two-year follow up period, 16.77% of beneficiaries at the national level had better physical health than expected, 51.96% were the same as expected, and 31.26% were worse than expected. The case-mix adjusted results for mortality and PCS revealed that at the national level, MAOs differed significantly on the mortality measure but not on the PCS measure. An overall *F* test showed that mortality differed significantly at the MAO level ($p < 0.0001$). "PCS better" differed significantly across all MAOs ($p < 0.0001$), but "PCS better or same" did not differ significantly ($p = 0.1261$). Because of this latter finding, PCS outliers could not be calculated and all MAOs fell into the "same as expected" designation.

How Is Your MAO Doing?

On the next page, Table 7 depicts the Physical Health Performance Measurement results for MAO HXXXA, each MAO in the state, the state total, and HOS Total. The Medicare Star Ratings measure for *Improving or Maintaining Physical Health* is derived from the combined "Percent Better+Same" results (68.74% for the HOS Total in the table).

In terms of physical health, your MAO performed as expected when compared to the HOS national average.[I]

[I] If your MAO performed "as expected," it does not indicate your MAO performed well or performed poorly. It indicates your MAO's performance on this measure differed by less than 2 standard deviations from the HOS national average.

Table 7: *2018-2020 Cohort 21* Physical Health Performance Measurement Results for MAOs in the state, StateXX and HOS Total

	Percent Better*	Percent Same*	Percent Worse*	Percent Better+Same*	Performance Results**
HXXXA	17.18%	52.57%	30.25%	69.75%	⇔
HXXXB	17.59%	49.96%	32.45%	67.55%	⇔
HXXXC	15.32%	50.82%	33.85%	66.15%	⇔
HXXXD	17.80%	51.58%	30.62%	69.38%	⇔
HXXXE	16.27%	52.36%	31.37%	68.63%	⇔
StateXX	16.72%	51.76%	31.52%	68.48%	
HOS Total	16.77%	51.96%	31.26%	68.74%	

* The percent better, same, worse, or better+same refers to beneficiary health status within an MAO.

** The statistical significance of the performance result for the MAO is indicated by one of the following symbols:

⬆ MAO performed significantly better than expected (higher than the national average)

⬇ MAO performed significantly worse than expected (lower than the national average)

⇔ MAO performed as expected (the same as the national average)

Data estimates are provided to the second decimal place for PCS and MCS change score measures as these estimates are used in the Medicare Star Ratings.

Mental Health

Performance measurement results for mental health are based on risk-adjusted two-year changes in MCS scores for the primary mental health outcome (MCS better or same). Over the two-year follow up period for mental health (MCS) at the national level, 13.75% of beneficiaries were better than expected, 66.36% were the same as expected, and 19.89% were worse than expected. The case-mix adjusted results for MCS reveal that at the national level MAOs differed significantly on this measure. An overall *F* test showed that "MCS better or same" differed significantly at the MAO level ($p = 0.0166$), as did "MCS better" ($p < 0.0001$).

Given that the primary mental health outcome measure (MCS better or same) differed significantly at the MAO level, outlier analysis for MCS was performed using *t*-tests. In the *Cohort 21 Performance Measurement* results, there were a total of 28 MCS outliers: 9 MAOs were identified as performing better than expected and 19 MAOs were identified as performing worse than expected compared with the national average for mental health.

The MCS may also be used as a screening tool for depression risk. Previous research suggested that individuals from a sample of the 1998 U.S. general population who have an MCS score of 42 or below are at increased risk for depression.[10] However, results from a Medicare population suggest an MCS score of 48 or below provides a reasonably predictive cut-off for depression risk in the elderly Medicare population.[11]

How Is Your MAO Doing?

On the next page, Table 8 depicts the Mental Health Performance Measurement results for MAO HXXXA, each MAO in the state, the state total, and HOS Total. The Medicare Star Ratings measure for *Improving or Maintaining Mental Health* is derived from the combined "Percent Better+Same" result (80.11% for the HOS Total in the table).

In terms of mental health, your MAO performed as expected when compared to the HOS national average.[J]

[J] If your MAO performed "as expected," it does not indicate your MAO performed well or performed poorly. It indicates your MAO's performance on this measure differed by less than 2 standard deviations from the HOS national average.

Table 8: *2018-2020 Cohort 21* Mental Health Performance Measurement Results for MAOs in the state, StateXX and HOS Total

	Percent Better*	Percent Same*	Percent Worse*	Percent Better+Same*	Performance Results**
HXXXA	15.23%	63.68%	21.09%	78.91%	⇔
HXXXB	15.06%	63.07%	21.87%	78.13%	⇔
HXXXC	16.35%	64.96%	18.69%	81.31%	⇔
HXXXD	16.18%	64.75%	19.07%	80.93%	⇔
HXXXE	13.56%	65.89%	20.54%	79.46%	⇔
StateXX	14.07%	65.60%	20.33%	79.67%	
HOS Total	13.75%	66.36%	19.89%	80.11%	

* The percent better, same, worse, or better+same refers to beneficiary health status within an MAO.

** The statistical significance of the performance result for the MAO is indicated by one of the following symbols:

⬆ MAO performed significantly better than expected (higher than the national average)

⬇ MAO performed significantly worse than expected (lower than the national average)

⇔ MAO performed as expected (the same as the national average)

Data estimates are provided to the second decimal place for PCS and MCS change score measures as these estimates are used in the Medicare Star Ratings.

PFADL Change Score Measure

The PFADL scale combines two VR-12 physical functioning questions (limitations in moderate activities and climbing stairs) with the six ADL questions to create a Likert-type scale, which ranges from 0-16. The PFADL scale has been used since the first *1998-2000 Cohort 1 Performance Measurement* as a baseline functional status covariate in the death models for calculation of Physical Health results, which combine risk-adjusted two-year mortality rates and changes in the PCS score. Responses from the six ADLs are also used by CMS in the annual frailty assessments for PACE programs. For the longitudinal change score, PFADL scale scores are created from the baseline and the two-year follow up questions. The eligible sample used to assess the longitudinal PFADL change measure consists of all beneficiaries aged 65 or older at HOS baseline measurement for whom baseline and follow-up PCS or MCS scores were available, and who had calculable baseline and follow-up PFADL scale scores.

The PFADL change score measure can be interpreted as approximating the percent of function retained by average MAO beneficiaries over two years compared to a maximum decline. A realistic clinical goal for many seniors is health maintenance with minimal functional decline, rather than improvement. Predicted PFADL change scores are estimated from a regression model that case-mix adjusts for baseline function. Contract-level change scores are on a 0-100 scale, with 100 equivalent to all MA beneficiaries retaining 100% of baseline function over two years and 0 corresponding to every beneficiary in the MA contract experiencing maximum decline.

In contrast to HEDIS measures, the PFADL change score measure for an MAO contract is its mean change score rather than the proportion passing the measure. The PFADL change score has good reliability and is positively correlated with both PCS and MCS scores calculated from HOS. A more detailed methodology used to create the PFADL change score measure is described on the Survey Results page of the HOS website (www.HOSonline.org).

How Is Your MAO Doing?

Table 9 below depicts the PFADL change score measure results for MAO HXXXA, each MAO in the state, your state, and the HOS Total. Since the PFADL change score measure approximates the percent of function retained by average MAO beneficiaries over two years, a higher score indicates little decline in function and therefore higher plan performance, while a lower score indicates greater functional decline and worse plan performance. The PFADL change score is posted as a display measure on the 2021 and 2022 Star Ratings Validation Tables in HPMS.

Table 9: *2018-2020 Cohort 21 Performance Measurement* PFADL Change Score Measure Results for MAOs in the state, StateXX and HOS Total

	PFADL Change Score*
HXXXA	96.87
HXXXB	94.24
HXXXC	94.23
HXXXD	92.47
HXXXE	93.82
StateXX	94.33
HOS Total	94.12

* The eligible sample used to assess the longitudinal PFADL change score measure consists of all MAO beneficiaries aged 65 or older at HOS baseline measurement for whom baseline and follow-up PCS or MCS scores were available, and who had calculable baseline and follow-up PFADL scale scores. The beneficiary level case-mix adjusted PFADL change scores are averaged across beneficiaries to create contract level scores. Contract-level change scores are on a 0-100 scale, with 100 equivalent to all MA beneficiaries retaining 100% of baseline function over two years and 0 corresponding to every beneficiary in the MA contract experiencing maximum decline. Contract level scores exceeding 100 are re-set to 100. More detailed information on the scoring and case-mix adjustment of the PFADL change score is described on the Survey Results page of the HOS website (www.HOSonline.org).
Note: If no beneficiaries reported for this measure, the result is *not applicable* (NA).

Table 10 depicts the mean PFADL scale at baseline and follow up, and the PFADL change score measure results for MAO HXXXA, your state, and the HOS Total. Baseline and Follow Up PFADL scales range from 0 - 16 and are used to derive the longitudinal PFADL change score measure.

Table 10: *2018-2020 Cohort 21 Performance Measurement* Mean PFADL Scale at Baseline and Follow Up and Change Score Measure Results for MAOs in the state, StateXX and HOS Total

	Mean PFADL Scale at Baseline	Mean PFADL Scale at Follow Up	PFADL Change Score
HXXXA	13.28	13.26	96.87
StateXX	13.39	13.08	94.33
HOS Total	13.74	13.39	94.12

Note: If no beneficiaries reported for these measures, the results are *not applicable* (NA).

Table 11 displays the means and percentile distributions of the PFADL change score measure results for your state, and the HOS Total. At the national level, the mean PFADL change score is 94.12, with a minimum of 67.59 and maximum of 100. The top 25% of MAOs had scores of 96.70 or greater, while 25% had scores of 92.72 or lower. Ten percent of MAOs had scores of 97.98 or higher, and 10% had scores of 89.27 or lower.

Table 11: *2018-2020 Cohort 21 Performance Measurement* PFADL Distribution of Change Score Measure Results for StateXX and HOS Total

	Mean	SD	P10	P25	Median	P75	P90	Min	Max
StateXX	94.33	1.60	92.47	93.82	94.23	94.24	96.87	92.47	96.87
HOS Total	94.12	4.06	89.27	92.72	94.93	96.70	97.98	67.59	100.0

Note: If no beneficiaries reported for this measure, the result is *not applicable* (NA). If there was only one MAO in the state, the standard deviation (SD) for the state was *not calculated* (NC).

Demographics

Table 12 presents the distribution of beneficiaries' age, gender, race, marital status, educational level, annual household income, and Medicaid status at baseline and follow up for your MAO and the HOS Total respondent sample.

Table 12: *2018-2020 Cohort 21 Performance Measurement* Demographics for MAO HXXXA and HOS Total at Baseline and Follow Up

	MAO HXXXA		HOS Total	
	Baseline N (%)	Follow Up N (%)	Baseline N (%)	Follow Up N (%)
Age	(N=160)	(N=160)	(N=76,004)	(N=76,004)
65-69	42 (26.3%)	18 (11.3%)	21,578 (28.4%)	10,699 (14.1%)
70-74	48 (30.0%)	51 (31.9%)	21,812 (28.7%)	23,381 (30.8%)
75-79	40 (25.0%)	43 (26.9%)	16,089 (21.2%)	18,835 (24.8%)
80-84	20 (12.5%)	32 (20.0%)	9,756 (12.8%)	12,348 (16.2%)
85+	10 (6.3%)	16 (10.0%)	6,769 (8.9%)	10,741 (14.1%)
Gender	(N=160)	(N=160)	(N=76,004)	(N=76,004)
Male	74 (46.3%)	74 (46.3%)	31,592 (41.6%)	31,591 (41.6%)
Female	86 (53.8%)	86 (53.8%)	44,412 (58.4%)	44,413 (58.4%)
Race	(N=160)	(N=160)	(N=76,004)	(N=76,004)
White	137 (85.6%)	137 (85.6%)	60,471 (79.6%)	60,475 (79.6%)
Black	9 (5.6%)	9 (5.6%)	7,577 (10.0%)	7,575 (10.0%)
Other/Unknown	14 (8.8%)	14 (8.8%)	7,956 (10.5%)	7,954 (10.5%)
Marital Status	(N=160)	(N=157)	(N=73,395)	(N=72,941)
Married	95 (59.4%)	88 (56.1%)	39,006 (53.1%)	36,657 (50.3%)
Widowed	35 (21.9%)	39 (24.8%)	16,474 (22.4%)	18,760 (25.7%)
Divorced or Separated	25 (15.6%)	25 (15.9%)	13,366 (18.2%)	12,990 (17.8%)
Never Married	5 (3.1%)	5 (3.2%)	4,549 (6.2%)	4,534 (6.2%)
Education	(N=160)	(N=157)	(N=72,798)	(N=72,492)
Did Not Graduate HS	32 (20.0%)	30 (19.1%)	12,724 (17.5%)	12,775 (17.6%)
High School Graduate	47 (29.4%)	44 (28.0%)	22,165 (30.4%)	21,949 (30.3%)
Some College	36 (22.5%)	38 (24.2%)	19,016 (26.1%)	18,936 (26.1%)
4 Year Degree or Beyond	45 (28.1%)	45 (28.7%)	18,893 (26.0%)	18,832 (26.0%)
Annual Household Income	(N=146)	(N=147)	(N=68,194)	(N=68,049)
Less than $10,000	19 (13.0%)	12 (8.2%)	8,256 (12.1%)	7,747 (11.4%)
$10,000-$19,999	19 (13.0%)	22 (15.0%)	10,723 (15.7%)	10,890 (16.0%)
$20,000-$29,999	16 (11.0%)	18 (12.2%)	9,415 (13.8%)	9,415 (13.8%)
$30,000-$49,999	30 (20.5%)	39 (26.5%)	13,625 (20.0%)	13,773 (20.2%)
$50,000 or More	46 (31.5%)	46 (31.3%)	18,474 (27.1%)	18,411 (27.1%)
Don't Know	16 (11.0%)	10 (6.8%)	7,701 (11.3%)	7,813 (11.5%)
Medicaid Status	(N=160)	(N=160)	(N=76,004)	(N=76,004)
Medicaid	33 (20.6%)	33 (20.6%)	16,621 (21.9%)	16,868 (22.2%)
Non-Medicaid	127 (79.4%)	127 (79.4%)	59,383 (78.1%)	59,136 (77.8%)

General Health and Comparative Health

Definition of Measures

- General health status is a self-reported measure of health perception using ratings of "Excellent," "Very good," "Good," "Fair," or "Poor."[12] This measure is found in Question 1 of the HOS 3.0.
- Two measures of physical and mental health compared to one year ago use ratings of "Much better," "Slightly better," "About the same," "Slightly worse," or "Much worse." These measures are found in Questions 8 and 9.

General self-rated health status is a valid and reliable method for assessing health across different populations.[2] Individuals who indicate that their general health was "Fair" or "Poor," or that their physical or mental health compared to one year ago was "Slightly worse" or "Much worse," are known to be at increased risk for near future hospitalization, use of mental health services, and mortality.[2,13,14]

How Is Your MAO Doing?

Table 13 presents the distribution of beneficiaries across *self-rated general health*, *physical health compared to one year ago*, and *mental health compared to one year ago* for MAO HXXXA and the HOS Total respondent sample at baseline and follow up.

Table 13: *2018-2020 Cohort 21 Performance Measurement* Frequency of Self-Rated General and Comparative Health Responses for MAO HXXXA and HOS Total at Baseline and Follow Up

	MAO HXXXA		HOS Total	
	Baseline	Follow Up	Baseline	Follow Up
Self-Rated Health Status	N (%)	N (%)	N (%)	N (%)
General Health				
Excellent to good*	125 (78.6%)	124 (78.5%)	58,246 (77.5%)	56,178 (75.1%)
Fair or poor	34 (21.4%)	34 (21.5%)	16,868 (22.5%)	18,653 (24.9%)
Comparative Health-Physical				
Much better to about the same**	120 (76.9%)	123 (78.3%)	57,466 (77.4%)	53,837 (73.2%)
Slightly worse or much worse	36 (23.1%)	34 (21.7%)	16,792 (22.6%)	19,680 (26.8%)
Comparative Health-Mental				
Much better to about the same**	142 (91.0%)	131 (84.0%)	65,996 (90.0%)	61,224 (84.0%)
Slightly worse or much worse	14 (9.0%)	25 (16.0%)	7,324 (10.0%)	11,653 (16.0%)

* Categories for general health included "Excellent," "Very good," or "Good."
** Categories for comparative health included "Much better," "Slightly better," or "About the same."

Depression

Definition of Measures

- The HOS includes two questions (Questions 39a and 39b) that serve as a screening measure for depression.[K] Each question is assigned points depending on the response given, from 0 ("Not at all") to 3 ("Nearly every day"). For this report, a Medicare beneficiary is considered to have a positive depression screen when he or she scores three points or greater on the combined total points of the two depression questions, when both questions are answered.

Individuals with a positive depression screen may be at risk for depressive disorders. Depression is under-diagnosed in the elderly Medicare population, and is a significant health problem that has been linked to poor health outcomes.[11,15] Older adults may suffer mental distress associated with limitations in daily activities, physical impairments, grief from loss of loved ones, changes in living situations, or untreated mental illness.[16] Additionally, depression is significantly associated with other psychological dysfunction, as well as the presence of common chronic medical conditions, such as diabetes.[17,18] As a result, older adults with depression are frequently misdiagnosed or do not receive proper treatment for their depressive symptoms.[19]

Depression screening tools, such as the one used in the HOS, have been developed for use in clinical settings to rapidly identify individuals at risk for major depression. Those with positive depression screens should be followed-up by more comprehensive diagnostic evaluations to identify whether or not they have major depression.[20,21] Evidence-based programs have been developed to improve mental health among older adults. Social supports through local area agencies may also be effective.[16]

How Is Your MAO Doing?

Table 14 depicts the percentage of beneficiaries with a positive depression screen, and the distribution of responses to the two individual depression questions for MAO HXXXA, and the HOS Total respondent sample at baseline and follow up.

[K] Beginning with the 2013 HOS 2.5, two depression screening questions from the Patient Health Questionnaire-2 (PHQ-2) replaced the questions that served as the depression screening measure in previous versions of the HOS. Due to the change in the depression screening methodology, estimates of the proportion with positive depression screens in this report are not comparable to estimates produced using the HOS versions 1.0 or 2.0.

Table 14: *2018-2020 Cohort 21 Performance Measurement* Frequency of Positive Depression Screen Responses for MAO HXXXA and HOS Total at Baseline and Follow Up

Depression Screening Questions	MAO HXXXA		HOS Total	
	Baseline N (%)	Follow Up N (%)	Baseline N (%)	Follow Up N (%)
Little interest or pleasure in doing things in past two weeks				
Not at all (0 pts)	116 (73.0%)	111 (71.2%)	52,670 (72.4%)	50,288 (69.3%)
Several days (1 pt)	28 (17.6%)	35 (22.4%)	12,863 (17.7%)	14,163 (19.5%)
More than half the days (2 pts)	13 (8.2%)	8 (5.1%)	4,083 (5.6%)	4,510 (6.2%)
Nearly every day (3 pts)	2 (1.3%)	2 (1.3%)	3,143 (4.3%)	3,598 (5.0%)
Feeling down, depressed, or hopeless in past two weeks				
Not at all (0 pts)	121 (77.6%)	119 (76.8%)	56,941 (78.2%)	53,757 (74.5%)
Several days (1 pt)	29 (18.6%)	30 (19.4%)	11,723 (16.1%)	13,466 (18.7%)
More than half the days (2 pts)	3 (1.9%)	3 (1.9%)	2,502 (3.4%)	2,892 (4.0%)
Nearly every day (3 pts)	3 (1.9%)	3 (1.9%)	1,659 (2.3%)	2,039 (2.8%)
Positive Depression Screen*	11 (7.1%)	10 (6.5%)	6,819 (9.5%)	7,757 (10.8%)

* A positive depression screen is defined as scoring 3 points or greater on the sum total of the two depression questions, when both questions are answered.

Pain

Definition of Measures

- The HOS includes three questions to measure self-reported pain over the previous seven days. Question 36 asks how much pain interfered with day-to-day activities from 1 ("Not at all") to 5 ("Very much"), and Question 37 asks how often pain kept the beneficiary from socializing from 1 ("Never") to 5 ("Always"). Both Questions 36 and 37 have five possible categorical responses. Question 38 asks the beneficiary to rate his/her average pain, ranging from 1 ("No pain") to 10 ("Worst imaginable pain").

Self-reported pain is common among seniors. Without proper pain management, opioid abuse[22,23] and alcohol abuse[24] are increasing among seniors as they attempt to control their pain. Several organizations have published recommendations on what should be done to improve the safety of opioid prescribing, including decreasing the risk of addiction and abuse.[25]

Pain screening is the initial step in establishing an appropriate pain management program for elderly beneficiaries. In fact, The Joint Commission requires assessment and management of pain when clinically indicated for patients in accredited hospitals, clinics, and long-term care facilities to minimize the risks associated with treatment.[25] Physical activity and complementary medicine techniques may be helpful alternatives in relieving certain types of pain.[26]

How Is Your MAO Doing?

Table 15 shows the distribution of self-rated pain scores, grouped into categories, for MAO HXXXA and the HOS Total respondent sample at baseline and follow up.

Table 15: *2018-2020 Cohort 21 Performance Measurement* Frequency of Self-Rated Pain Score for MAO HXXXA and HOS Total at Baseline and Follow Up

	MAO HXXXA		HOS Total	
	Baseline	Follow Up	Baseline	Follow Up
Pain Score	N (%)	N (%)	N (%)	N (%)
1 (None)	46 (29.7%)	35 (22.9%)	21,393 (29.6%)	20,735 (29.0%)
2-4	68 (43.9%)	77 (50.3%)	31,649 (43.7%)	30,419 (42.5%)
5-7	32 (20.6%)	32 (20.9%)	13,604 (18.8%)	14,284 (20.0%)
8-10	9 (5.8%)	9 (5.9%)	5,731 (7.9%)	6,157 (8.6%)

Table 16 illustrates the relationship between the reported extent that pain interfered with day-to-day activities and the mean unadjusted PCS score for MAO HXXXA and the HOS Total respondent sample at baseline and follow up. Please note, if only one member reported in a category, the standard deviation (SD) was *not calculated* (NC) for the category in Table 16 or any applicable tables.

Table 16: *2018-2020 Cohort 21 Performance Measurement* Mean Unadjusted PCS Score at Baseline and Follow Up by Extent Pain Interfered with Day-to-Day Activities at Follow Up for MAO HXXXA and HOS Total

Extent Pain Interfered with Day-to-Day Activities	MAO HXXXA		HOS Total	
	Baseline Mean (SD)	Follow Up Mean (SD)	Baseline Mean (SD)	Follow Up Mean (SD)
Not at all	49.3 (7.2)	50.4 (5.7)	47.9 (8.8)	48.7 (8.2)
A little bit	40.6 (8.8)	41.4 (10.2)	41.5 (10.0)	40.5 (9.1)
Somewhat	37.9 (9.7)	34.9 (8.1)	35.0 (10.4)	32.4 (8.9)
Quite a bit	32.7 (11.9)	24.9 (8.4)	29.7 (10.7)	25.9 (8.5)
Very much	20.0 (6.0)	27.1 (7.7)	25.4 (10.9)	21.2 (8.8)

Table 17 shows the relationship between the reported extent that pain interfered with socialization with others and the mean unadjusted MCS score for MAO HXXXA and the HOS Total respondent sample at baseline and follow up.

Table 17: *2018-2020 Cohort 21 Performance Measurement* Mean Unadjusted MCS Score at Baseline and Follow Up by Extent Pain Interfered with Socializing with Others at Follow Up for MAO HXXXA and HOS Total

Extent Pain Interfered with Socializing with Others	MAO HXXXA		HOS Total	
	Baseline Mean (SD)	Follow Up Mean (SD)	Baseline Mean (SD)	Follow Up Mean (SD)
Never	58.1 (6.7)	57.6 (5.8)	57.1 (7.4)	56.9 (7.5)
Rarely	51.2 (10.6)	52.4 (7.1)	52.9 (9.9)	51.4 (9.8)
Sometimes	46.9 (11.6)	47.6 (10.7)	48.7 (11.2)	46.3 (10.8)
Often	46.5 (13.8)	40.0 (17.5)	44.8 (12.6)	41.1 (12.1)
Always	45.4 (6.8)	45.0 (6.4)	41.5 (14.0)	36.2 (14.2)

Chronic Medical Conditions

Definition of Measures

- Chronic medical conditions are multiple measures of the prevalence of chronic disease across the beneficiary lifespan. Chronic conditions are those that last a year or more, and require ongoing medical attention and/or limit ADLs. Fifteen measures are found in Questions 20-34.

For older adults, the presence of chronic medical conditions can reduce the quality of life, accelerate a decline in functioning, and lead to conflicting medical advice when care is not coordinated.[3] The increased cost associated with chronic disease is an important factor driving overall Medicare spending.[27] This cost is further exacerbated by the proportion of multiple chronic conditions in the population, which accounts for over three-fourths of those 65 and over.[28] An important feature of the Medicare HOS is the ability to report and quantify self-reported chronic conditions in the MA population.

How Is Your MAO Doing?

Table 18 shows the prevalence of 15 chronic medical conditions for MAO HXXXA and the HOS Total respondent sample. Depression was added to the list of chronic medical conditions in the 2013 HOS 2.5. The chronic medical conditions are quantified in the HOS when beneficiaries positively respond to the question, "Has a doctor ever told you that you had (the specified condition)?"

Table 18: *2018-2020 Cohort 21 Performance Measurement* Prevalence of Chronic Medical Conditions for MAO HXXXA and HOS Total at Baseline and Follow Up

	MAO HXXXA		HOS Total	
Medical Conditions	Baseline N (%)	Follow Up N (%)	Baseline N (%)	Follow Up N (%)
Hypertension	96 (61.1%)	96 (60.8%)	48,615 (65.7%)	49,013 (66.9%)
Arthritis - Hip or Knee	74 (47.1%)	71 (45.2%)	31,655 (42.9%)	32,800 (45.0%)
Arthritis - Hand or Wrist	61 (39.1%)	64 (40.8%)	26,405 (35.8%)	27,155 (37.3%)
Diabetes	36 (22.9%)	36 (22.9%)	19,245 (26.0%)	19,818 (27.1%)
Sciatica	42 (26.8%)	44 (27.8%)	18,677 (25.4%)	18,708 (25.7%)
Other Heart Conditions	28 (17.7%)	34 (21.5%)	14,754 (20.0%)	16,394 (22.5%)
Osteoporosis	25 (15.8%)	30 (19.2%)	15,120 (20.6%)	16,086 (22.1%)
Pulmonary Disease	21 (13.3%)	29 (18.4%)	12,373 (16.7%)	13,080 (17.9%)
Depression	25 (15.9%)	22 (14.1%)	12,495 (17.0%)	12,939 (17.8%)
Any Cancer (except skin cancer)	18 (11.6%)	25 (16.9%)	10,462 (14.5%)	11,129 (16.2%)
Coronary Artery Disease	16 (10.1%)	13 (8.2%)	8,481 (11.6%)	9,199 (12.7%)
Congestive Heart Failure	11 (7.1%)	11 (7.0%)	5,112 (6.9%)	6,409 (8.8%)
Myocardial Infarction	11 (7.0%)	10 (6.4%)	5,629 (7.6%)	6,096 (8.4%)
Stroke	6 (3.8%)	9 (5.7%)	4,609 (6.2%)	5,184 (7.1%)
Gastrointestinal Disease	5 (3.2%)	4 (2.5%)	3,619 (4.9%)	3,743 (5.1%)

A longitudinal study using HOS data concluded that multiple conditions at baseline and the two-year follow up were associated with worse health in terms of ADLs and Health Related Quality of Life (HRQOL), and are important outcomes for intervention to improve long-term health.[29]

An earlier study of HOS beneficiaries found that beneficiaries with multiple chronic conditions and risk for depression had the largest mental health decline over the two-year follow up period. In this study, people with multiple chronic conditions had greater risks for mortality, poor functional status, unnecessary hospitalizations, adverse drug events, duplicative tests, and conflicting medical advice.[30] According to the Centers for Disease Control and Prevention (CDC), around 50% of older adults have at least two chronic medical conditions, which can increase the risk of depression.[19]

Table 19 presents the frequencies of beneficiaries who reported none, one, two, three, or four or more chronic medical conditions at baseline and follow up for your MAO and the HOS Total respondent sample.

Table 19: *2018-2020 Cohort 21 Performance Measurement* Number of Chronic Medical Conditions for MAO HXXXA and HOS Total at Baseline and Follow Up

	MAO HXXXA		HOS Total	
	Baseline	Follow Up	Baseline	Follow Up
Number of Conditions	N (%)	N (%)	N (%)	N (%)
None	15 (9.5%)	11 (7.0%)	6,402 (8.6%)	5,658 (7.7%)
1 Condition	31 (19.6%)	26 (16.5%)	12,095 (16.2%)	10,902 (14.8%)
2 Conditions	31 (19.6%)	32 (20.3%)	14,120 (18.9%)	13,403 (18.2%)
3 Conditions	24 (15.2%)	29 (18.4%)	12,888 (17.3%)	12,753 (17.3%)
4 or More Conditions	57 (36.1%)	60 (38.0%)	29,012 (38.9%)	31,030 (42.1%)

In Table 20, the means and standard deviations (SD) for unadjusted PCS and MCS scores at follow up are presented, grouped by the number of chronic medical conditions reported, for your MAO and the HOS Total respondent sample.

Table 20: *2018-2020 Cohort 21 Performance Measurement* Mean Unadjusted PCS and MCS Scores at Follow Up by Number of Chronic Medical Conditions at Follow Up for MAO HXXXA and HOS Total

	Mean (SD) Unadjusted PCS		Mean (SD) Unadjusted MCS	
	MAO HXXXA	HOS Total	MAO HXXXA	HOS Total
Number of Conditions†	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
None	50.4 (4.8)	49.7 (8.1)	56.3 (8.2)	56.8 (7.0)
1 Condition	46.6 (9.1)	47.8 (9.0)	58.6 (6.0)	56.3 (7.5)
2 Conditions	48.4 (9.9)	44.5 (10.3)	56.1 (6.3)	55.5 (8.5)
3 Conditions	40.0 (10.7)	41.4 (10.8)	55.7 (7.4)	54.5 (9.5)
4 or More Conditions	35.5 (11.4)	33.9 (11.7)	50.9 (11.2)	50.2 (11.9)

† If no beneficiaries reported for a category, the result is *not applicable* (NA). If only one member reported in a category, the standard deviation (SD) was *not calculated* (NC).

Activities of Daily Living

Definition of Measures

- ADLs refer to a set of common daily tasks that are necessary for personal self-care and independent living.[31] ADLs include bathing, dressing, eating, getting in or out of chairs, walking, and using the toilet. These measures are found in Question 10. Impairment with ADLs is defined as beneficiaries who reported either difficulty or inability to perform the specific ADL ("Yes, I have difficulty" or "I am unable to do this activity").
- Instrumental Activities of Daily Living (IADLs) assess independent living skills that are more complex than ADLs.[32,33] IADLs include preparing meals, managing money, and taking medications. These measures are in Question 11. For IADLs, impairment is defined as beneficiaries who reported difficulty performing the specific IADL ("Yes, I have difficulty").

Six ADLs are included in the HOS to examine reported difficulty with the performance of daily tasks. The HOS also includes three IADLs that examine reported difficulty with the performance of tasks of independence. The ability to perform ADLs is predictive of current disease status and mortality risk,[34,35] while IADLs recognize earlier changes in functioning, and can indicate the need for intervention or further medical work-up.[33]

How Is Your MAO Doing?

Table 21 shows the numbers and percentages of beneficiaries with impairment in each of the six ADLs and three IADLs for your MAO and the HOS Total respondent sample at baseline and follow up.

Table 21: *2018-2020 Cohort 21 Performance Measurement* Prevalence of Impaired ADLs and IADLs for MAO HXXXA and HOS Total at Baseline and Follow Up

	MAO HXXXA		HOS Total	
Impairment Type	Baseline N (%)	Follow Up N (%)	Baseline N (%)	Follow Up N (%)
Activities of Daily Living				
Walking	40 (25.2%)	46 (29.3%)	20,444 (27.6%)	23,604 (32.2%)
Getting in/out of chairs	16 (10.1%)	21 (13.4%)	13,011 (17.6%)	15,815 (21.5%)
Bathing	16 (10.1%)	9 (5.8%)	8,238 (11.1%)	9,972 (13.6%)
Dressing	13 (8.2%)	9 (5.7%)	6,510 (8.8%)	7,756 (10.5%)
Using the toilet	9 (5.7%)	6 (3.9%)	4,399 (5.9%)	5,689 (7.8%)
Eating	2 (1.3%)	1 (0.6%)	2,417 (3.3%)	3,286 (4.5%)
Instrumental Activities of Daily Living*				
Preparing meals	11 (7.3%)	13 (8.8%)	6,053 (8.8%)	7,089 (10.6%)
Managing money	3 (2.0%)	3 (2.0%)	2,840 (4.0%)	2,962 (4.3%)
Taking medications as prescribed	6 (3.9%)	3 (2.0%)	2,569 (3.6%)	3,172 (4.5%)

* Respondents who indicated "I don't do this activity" to IADL questions were removed from the denominator.

Table 22 presents the frequencies of ADL and IADL impairments at baseline and follow up for your MAO and the HOS Total respondent sample. Regular assessment of functional status is recommended for improving the effectiveness of care, especially for older adults prior to hospital discharge and those living with dementia.[35]

Table 22: *2018-2020 Cohort 21 Performance Measurement* Number of ADL and IADL Impairments for MAO HXXXA and HOS Total at Baseline and Follow Up

	MAO HXXXA		HOS Total	
Number of Impairments	Baseline N (%)	Follow Up N (%)	Baseline N (%)	Follow Up N (%)
Activities of Daily Living				
None	117 (73.6%)	108 (68.8%)	50,657 (67.9%)	46,819 (63.3%)
1 ADL Impairment	17 (10.7%)	26 (16.6%)	9,867 (13.2%)	10,443 (14.1%)
2 ADL Impairments	10 (6.3%)	13 (8.3%)	6,166 (8.3%)	6,936 (9.4%)
3 or More ADL Impairments	15 (9.4%)	10 (6.4%)	7,886 (10.6%)	9,792 (13.2%)
Instrumental Activities of Daily Living*				
None	141 (89.8%)	140 (90.9%)	65,209 (88.3%)	62,792 (86.4%)
1 IADL Impairment	12 (7.6%)	10 (6.5%)	6,460 (8.7%)	7,350 (10.1%)
2 IADL Impairments	4 (2.5%)	3 (1.9%)	1,484 (2.0%)	1,747 (2.4%)
3 IADL Impairments	0	1 (0.6%)	678 (0.9%)	793 (1.1%)

* Respondents who indicated "I don't do this activity" to IADL questions were removed from the denominator.

Table 23 presents means and SDs for unadjusted PCS and MCS scores by the number of ADL and IADL impairments at follow up for your MAO and the HOS Total respondent sample. Multiple impairments are associated with substantially lower PCS and MCS scores for the HOS respondents.

Table 23: *2018-2020 Cohort 21 Performance Measurement* Mean Unadjusted PCS and MCS Scores at Follow Up by Number of ADL and IADL Impairments at Follow Up for MAO HXXXA and HOS Total

	Mean (SD) Unadjusted PCS		Mean (SD) Unadjusted MCS	
Impairment Type†	MAO HXXXA	HOS Total	MAO HXXXA	HOS Total
Activities of Daily Living				
None	47.4 (7.5)	46.5 (8.7)	56.2 (6.6)	55.9 (7.9)
1 ADL Impairment	32.5 (9.9)	34.4 (9.4)	53.6 (9.8)	52.8 (10.7)
2 ADL Impairments	28.4 (9.0)	29.5 (9.1)	54.6 (11.7)	50.7 (11.5)
3 or More ADL Impairments	25.4 (9.5)	25.0 (8.9)	37.4 (10.7)	43.4 (13.1)
Instrumental Activities of Daily Living*				
None	43.9 (10.2)	42.7 (11.1)	55.5 (7.8)	55.0 (8.9)
1 IADL Impairment	28.1 (11.3)	27.3 (10.2)	53.7 (10.1)	45.7 (12.3)
2 IADL Impairments	23.4 (11.2)	27.2 (9.5)	37.7 (8.8)	40.2 (11.7)
3 IADL Impairments	40.4 (NC)	27.7 (8.7)	37.5 (NC)	38.5 (12.3)

† If no beneficiaries reported for a category, the result is *not applicable* (NA). If only one member reported in a category, the standard deviation (SD) was *not calculated* (NC).

* Respondents who indicated "I don't do this activity" to IADL questions were removed from the denominator.

Healthy Days Measures

Definition of Measures

- Physically unhealthy days is a self-reported measure of the number of days during the past 30 days when physical health was not good. The measure is found in Question 12.
- Mentally unhealthy days is a self-reported measure of the number of days during the past 30 days when mental health was not good. The measure is found in Question 13.
- Days with activity limitations is a self-reported measure of the number of days during the past 30 days when poor physical or mental health kept the beneficiary from usual activities. The measure is found in Question 14.

Healthy Days Measures provide key information on the functional status of vulnerable sub-populations, and are used to assess the HRQOL[36] across the U.S. As sentinel indicators of present and future disease and injury risk, MAOs may use Healthy Days Measures to identify vulnerable sub-populations for effective preventative care and disease management. According to the CDC, "In recent years, several organizations have found these Healthy Days Measures useful at the national, state, and community levels for (1) identifying health disparities, (2) tracking population trends, and (3) building broad coalitions around a measure of population health compatible with the World Health Organization's definition of health."[37] The CDC HRQOL program considers 14 or more unhealthy days in the past 30 days an indicator of poor well-being.[4]

How Is Your MAO Doing?

Table 24 provides the frequency distributions of Healthy Days Measures for your MAO and HOS Total respondent sample.

Table 24: *2018-2020 Cohort 21 Performance Measurement* Distribution of Healthy Days Measures for MAO HXXXA and HOS Total at Baseline and Follow Up

	MAO HXXXA		HOS Total	
	Baseline	Follow Up	Baseline	Follow Up
Healthy Days Measures	**N (%)**	**N (%)**	**N (%)**	**N (%)**
Physically Unhealthy Days	(N=153)	(N=154)	(N=71,975)	(N=71,520)
None	89 (58.2%)	101 (65.6%)	41,527 (57.7%)	41,678 (58.3%)
1-13	37 (24.2%)	37 (24.0%)	18,277 (25.4%)	17,059 (23.9%)
14-30	27 (17.6%)	16 (10.4%)	12,171 (16.9%)	12,783 (17.9%)
Mentally Unhealthy Days	(N=155)	(N=156)	(N=72,205)	(N=71,894)
None	107 (69.0%)	103 (66.0%)	51,140 (70.8%)	48,445 (67.4%)
1-13	30 (19.4%)	42 (26.9%)	14,347 (19.9%)	15,703 (21.8%)
14-30	18 (11.6%)	11 (7.1%)	6,718 (9.3%)	7,746 (10.8%)
Days with Activity Limitations	(N=156)	(N=159)	(N=72,662)	(N=71,906)
None	116 (74.4%)	119 (74.8%)	53,244 (73.3%)	52,199 (72.6%)
1-13	20 (12.8%)	25 (15.7%)	11,238 (15.5%)	10,608 (14.8%)
14-30	20 (12.8%)	15 (9.4%)	8,180 (11.3%)	9,099 (12.7%)

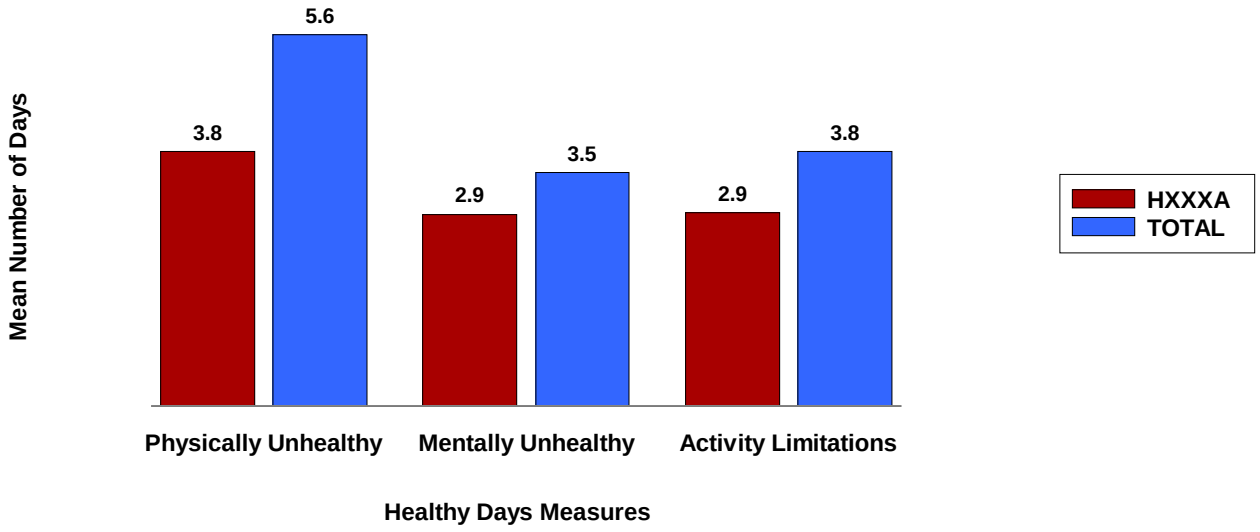
Table 25 presents the mean unadjusted MCS scores at baseline and follow up for your MAO and the HOS Total respondent sample by the number of mentally unhealthy days at follow up.

Table 25: *2018-2020 Cohort 21 Performance Measurement* Mean Unadjusted MCS Scores at Baseline and Follow Up by Number of Mentally Unhealthy Days at Follow Up for MAO HXXXA and HOS Total

	MAO HXXXA		HOS Total	
Mentally Unhealthy Days	Baseline MCS Mean (SD)	Follow Up MCS Mean (SD)	Baseline MCS Mean (SD)	Follow Up MCS Mean (SD)
None	57.4 (7.7)	57.9 (6.1)	57.4 (7.4)	57.7 (6.8)
1-13	51.2 (11.0)	49.8 (8.4)	51.2 (9.5)	48.7 (8.3)
14-30	44.7 (9.8)	38.7 (11.5)	43.0 (12.6)	36.4 (10.9)

Figure 3 presents the results of the Healthy Days Measures as the mean number of unhealthy days in the previous 30 days for each of the three measures that were reported by beneficiaries at follow up for your MAO and the HOS Total respondent sample.

Figure 3: *2018-2020 Cohort 21 Performance Measurement* Mean Number of Unhealthy Days for the Healthy Days Measures for MAO HXXXA and HOS Total at Follow Up



Body Mass Index

Definition of Measures

- Self-reported height and weight values are used to calculate BMI,[L] a measure that correlates with the amount of body fat in adult men and women. BMI is derived from Questions 55 and 56.[M]

A BMI of 30 or higher is considered obese and increases risk for several chronic conditions including: hypertension, dyslipidemia, type 2 diabetes, coronary heart disease, stroke, gallbladder disease, osteoarthritis, sleep apnea, and some cancers.[38] Being overweight (BMI 25-29.99) or obese has also been shown to accelerate the aging process.[39] Physical activity, diet, age, gender, ethnicity, and educational status are known to influence the risk for obesity.[40] For instance, females are at higher risk of developing morbid obesity than males. The prevalence of obesity among older adults has risen significantly over the past 30 years.[41,42] A BMI under 18.5 is considered underweight. Rapid weight loss often indicates an underlying disease and can accelerate the loss of muscle mass, which naturally occurs with the aging process.[43]

A study using the HOS *2006-2008 Cohort 9 Merged Baseline* and *Follow Up* data explored the prevalence of obesity in MA beneficiaries age 65 or older.[44] In this study, most of the reported health conditions were significantly more prevalent among obese than normal weight beneficiaries, in particular, high blood pressure (75.8% of obese vs. 53.9% of normal weight), diabetes (34.8% vs. 12.7%), and arthritis of the hip or knee (55.3% vs. 31.3%). Exceptions were osteoporosis and stroke. Osteoporosis was significantly less prevalent among the obese (16.1% vs. 26.9%). The prevalence of stroke increased only slightly with BMI (7.9% vs. 7.3%). The results also indicated that obese beneficiaries had substantially greater limitations with ADLs than normal weight beneficiaries.[44]

How Is Your MAO Doing?

Table 26 shows the distribution of BMI categories by gender, including underweight (BMI less than 18.5), normal weight (BMI of 18.5-24.99), overweight (BMI of 25-29.99), and obese (BMI of 30 or more) for MAO HXXXA and the HOS Total respondent sample.

[L] BMI is calculated as: BMI = [weight in pounds / (height in inches)^2] x 703, which uses the beneficiary's self-reported height and weight to produce the standard measure of kg/m^2 units.
[M] Beginning in 2012, questions for weight and height changed from categorical responses to open ended responses.

Table 26: *2018-2020 Cohort 21 Performance Measurement* Distribution of BMI Categories by Gender for MAO HXXXA and HOS Total at Baseline and Follow Up

	MAO HXXXA		HOS Total	
BMI Category	Baseline N (%)	Follow Up N (%)	Baseline N (%)	Follow Up N (%)
Male				
Underweight (<18.5)	0	0	326 (1.1%)	434 (1.5%)
Normal (18.5-24.99)	14 (20.6%)	17 (23.3%)	7,334 (25.2%)	8,131 (28.0%)
Overweight (25-29.99)	30 (44.1%)	30 (41.1%)	12,838 (44.1%)	12,390 (42.7%)
Obese (≥30)	24 (35.3%)	26 (35.6%)	8,601 (29.6%)	8,087 (27.8%)
Female				
Underweight (<18.5)	1 (1.2%)	0	809 (2.0%)	1,131 (2.8%)
Normal (18.5-24.99)	30 (37.0%)	33 (41.8%)	12,593 (31.2%)	13,132 (32.6%)
Overweight (25-29.99)	22 (27.2%)	20 (25.3%)	13,634 (33.8%)	13,167 (32.7%)
Obese (≥30)	28 (34.6%)	26 (32.9%)	13,335 (33.0%)	12,802 (31.8%)

Note: BMI categories were modified beginning with the *2017 Cohort 20 Baseline* Report. Underweight was changed from "<20" to "<18.5" and normal weight was changed from "20 to 24.99" to "18.5 to 24.99."

Sleep Measures

Definition of Measures

- Sleep duration is a self-reported measure of the average number of hours of actual sleep at night during the past month. The measure is found in Question 53.
- Sleep quality is a self-reported measure that rates the overall sleep quality during the past month. The measure is found in Question 54.

Two sleep questions added in the 2015 HOS 3.0 were drawn from the Pittsburgh Sleep Quality Index (PSQI). The questions focus on "habitual" (i.e., past month) sleep duration and quality, rather than past week measures, in order to capture more chronic sleep disturbances. The PSQI has a high test-retest reliability and good validity in patients with insomnia.[45]

Over half of older adults suffer from symptoms of insomnia, a common problem related to aging.[46] Sleep disorders in the elderly can be caused by a number of factors, including medication, diseases, poor sleeping habits, and age-related changes in circadian sleep/wake regulation. There is substantial evidence linking insufficient sleep duration and poor sleep quality to mental and physical health morbidity and mortality.[47] Various epidemiologic findings associate sleep duration with obesity, diabetes, impaired glucose tolerance, hypertension, and mortality. People who report fair or poor health are less likely to overestimate sleep hours and report shorter sleep hours on average than those with better self-rated health.[48] These observations provide a basis for future studies on weight control interventions and maintenance of daily routines in sleep habits to increase the quantity and quality of sleep.

How Is Your MAO Doing?

Table 27 provides frequency distributions of sleep duration ("Less than 5," "5–6," "7–8," and "9 or more hours") and sleep quality ("Very good," "Fairly good," "Fairly bad," and "Very bad") for MAO HXXXA and the HOS Total at Baseline and Follow Up.

Table 27: *2018-2020 Cohort 21 Performance Measurement* Distributions of Sleep Duration and Quality for MAO HXXXA and HOS Total at Baseline and Follow Up

	MAO HXXXA		HOS Total	
Sleep Questions	Baseline N (%)	Follow Up N (%)	Baseline N (%)	Follow Up N (%)
Hours of actual sleep				
Less than 5 hours	6 (3.8%)	7 (4.5%)	5,147 (7.1%)	5,486 (7.5%)
5-6 hours	66 (41.8%)	58 (37.2%)	27,389 (37.5%)	27,577 (37.8%)
7-8 hours	81 (51.3%)	88 (56.4%)	36,621 (50.2%)	35,586 (48.8%)
9 or more hours	5 (3.2%)	3 (1.9%)	3,784 (5.2%)	4,313 (5.9%)
Overall sleep quality				
Very good	47 (29.6%)	37 (23.3%)	18,589 (25.4%)	17,316 (23.6%)
Fairly good	88 (55.3%)	104 (65.4%)	43,911 (60.0%)	44,561 (60.8%)
Fairly bad	20 (12.6%)	13 (8.2%)	8,882 (12.1%)	9,538 (13.0%)
Very bad	4 (2.5%)	5 (3.1%)	1,745 (2.4%)	1,835 (2.5%)

Health Status by Baseline Demographic Groups for MAO HXXXA

Evidence from several studies suggests the differences in health among Medicare eligible beneficiaries by age, gender, racial, and socioeconomic groups.[49,50,51,52,53,54] The following tables show differences in health status by demographic categories, including potential disparities within your MAO, and illustrate changes from baseline to follow up measurement. Groups are defined by the sub-categories for a demographic characteristic (e.g., the 65-69 age group or White race).

Table 28: *2018-2020 Cohort 21 Performance Measurement* Distribution of Mean Unadjusted PCS and MCS Scores* at Baseline and Follow Up by Baseline Demographic Group for MAO HXXXA

	Unadjusted PCS		Unadjusted MCS	
Baseline Demographic	Baseline Mean (SD)	Follow Up Mean (SD)	Baseline Mean (SD)	Follow Up Mean (SD)
MAO HXXXA Total	42.2 (11.0)	41.7 (11.7)	54.7 (9.7)	54.4 (9.2)
Age				
65-69	45.6 (9.6)	44.8 (10.7)	55.1 (8.6)	54.8 (7.8)
70-74	42.6 (10.9)	43.6 (10.5)	55.2 (8.5)	55.8 (7.6)
75-79	40.4 (10.9)	39.8 (12.6)	53.9 (11.2)	51.9 (9.9)
80-84	40.3 (12.3)	36.5 (13.3)	53.5 (13.0)	54.8 (12.8)
85+	36.7 (12.9)	37.1 (10.1)	56.9 (6.6)	55.0 (10.2)
Gender				
Male	42.9 (10.9)	42.2 (11.6)	55.0 (9.5)	54.9 (8.3)
Female	41.5 (11.1)	41.2 (11.8)	54.5 (10.0)	54.0 (9.9)
Race				
White	43.0 (10.2)	41.9 (11.7)	55.0 (9.5)	54.7 (8.4)
Black	36.6 (16.7)	41.8 (11.3)	54.5 (8.4)	56.8 (8.4)
Other/Unknown	38.0 (13.1)	39.2 (12.8)	51.9 (12.4)	49.3 (14.3)
Marital Status				
Married	43.9 (10.0)	42.7 (11.7)	56.3 (8.3)	56.1 (7.8)
Widowed	38.5 (12.6)	38.7 (11.9)	52.2 (12.2)	52.4 (11.9)
Divorced or Separated	40.7 (11.8)	42.5 (10.2)	52.6 (10.3)	51.3 (8.6)
Never Married	42.6 (10.4)	38.8 (16.7)	52.3 (8.1)	51.0 (10.7)
Education				
Did Not Graduate HS	35.3 (12.2)	36.8 (12.8)	49.2 (10.4)	49.5 (12.6)
High School Graduate	39.5 (10.8)	39.4 (10.8)	55.4 (10.4)	55.7 (9.3)
Some College	45.7 (10.3)	44.2 (10.8)	57.3 (7.0)	55.6 (7.5)
4 Year Degree or Beyond	47.0 (7.2)	45.5 (11.0)	55.9 (9.2)	55.4 (6.1)
Annual Household Income				
Less than $10,000	33.9 (10.0)	39.4 (9.4)	52.1 (12.3)	50.0 (10.3)
$10,000-$19,999	39.9 (11.9)	38.0 (12.3)	50.9 (9.1)	53.1 (9.1)
$20,000-$29,999	41.8 (9.1)	39.5 (11.3)	55.0 (7.7)	52.9 (7.9)
$30,000-$49,999	44.2 (11.2)	41.5 (11.3)	54.7 (10.7)	54.7 (11.1)
$50,000 or More	44.9 (10.4)	44.8 (11.1)	56.5 (8.7)	56.0 (7.6)
Don't Know	39.6 (11.1)	37.0 (15.9)	55.0 (11.4)	53.4 (11.5)
Medicaid Status				
Medicaid	31.8 (11.7)	38.1 (11.4)	50.4 (10.6)	48.7 (11.9)
Non-Medicaid	44.9 (9.1)	42.6 (11.6)	55.8 (9.2)	55.8 (7.8)

* Mean unadjusted PCS and MCS scores are the raw scores used to determine the final adjusted change scores in the *Cohort 21 Performance Measurement* Results section. Beneficiaries are displayed according to their baseline demographic group.

Table 29: *2018-2020 Cohort 21 Performance Measurement* Distribution of Self-Rated General Health Status, and Physical and Mental Health Status Compared to One Year Ago at Baseline and Follow Up by Baseline Demographic Group for MAO HXXXA

	General Health Status Poor or Fair		Comparative Health-Physical Slightly Worse or Much Worse		Comparative Health-Mental Slightly Worse or Much Worse	
	Baseline	Follow Up*	Baseline	Follow Up*	Baseline	Follow Up*
Baseline Demographic	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
MAO HXXXA Total	34 (21.4%)	34 (21.5%)	36 (23.1%)	34 (21.7%)	14 (9.0%)	25 (16.0%)
Age						
65-69	6 (14.3%)	7 (17.1%)	6 (14.6%)	8 (19.0%)	2 (4.9%)	8 (19.0%)
70-74	9 (18.8%)	6 (12.5%)	10 (21.7%)	7 (14.9%)	3 (6.5%)	7 (15.2%)
75-79	9 (22.5%)	11 (27.5%)	8 (20.5%)	7 (17.9%)	3 (7.7%)	6 (15.4%)
80-84	7 (35.0%)	8 (40.0%)	8 (40.0%)	9 (47.4%)	5 (25.0%)	4 (21.1%)
85+	3 (33.3%)	2 (22.2%)	4 (40.0%)	3 (30.0%)	1 (10.0%)	0
Gender						
Male	12 (16.4%)	14 (19.4%)	18 (25.4%)	15 (20.8%)	5 (6.9%)	14 (19.4%)
Female	22 (25.6%)	20 (23.3%)	18 (21.2%)	19 (22.4%)	9 (10.7%)	11 (13.1%)
Race						
White	26 (19.1%)	25 (18.5%)	29 (21.6%)	28 (20.7%)	11 (8.2%)	21 (15.7%)
Black	2 (22.2%)	3 (33.3%)	2 (22.2%)	2 (22.2%)	1 (11.1%)	0
Other/Unknown	6 (42.9%)	6 (42.9%)	5 (38.5%)	4 (30.8%)	2 (15.4%)	4 (30.8%)
Marital Status						
Married	13 (13.7%)	18 (19.1%)	18 (19.4%)	18 (19.4%)	5 (5.5%)	12 (12.9%)
Widowed	13 (38.2%)	10 (29.4%)	10 (28.6%)	8 (23.5%)	6 (17.1%)	8 (24.2%)
Divorced or Separated	7 (28.0%)	4 (16.0%)	7 (30.4%)	7 (28.0%)	3 (12.0%)	5 (20.0%)
Never Married	1 (20.0%)	2 (40.0%)	1 (20.0%)	1 (20.0%)	0	0
Education						
Did Not Graduate HS	15 (48.4%)	16 (50.0%)	11 (36.7%)	8 (27.6%)	5 (16.7%)	5 (17.2%)
High School Graduate	12 (25.5%)	9 (19.6%)	9 (20.0%)	10 (21.3%)	3 (6.5%)	4 (8.5%)
Some College	3 (8.3%)	4 (11.1%)	4 (11.1%)	3 (8.3%)	1 (2.9%)	4 (11.4%)
4 Year Degree or Beyond	4 (8.9%)	5 (11.4%)	12 (26.7%)	13 (28.9%)	5 (11.1%)	12 (26.7%)
Annual Household Income						
Less than $10,000	7 (38.9%)	6 (31.6%)	5 (29.4%)	3 (16.7%)	1 (5.3%)	1 (5.6%)
$10,000-$19,999	8 (42.1%)	5 (26.3%)	5 (26.3%)	4 (22.2%)	1 (5.3%)	3 (16.7%)
$20,000-$29,999	4 (25.0%)	5 (33.3%)	5 (31.3%)	4 (26.7%)	3 (18.8%)	3 (20.0%)
$30,000-$49,999	5 (16.7%)	5 (16.7%)	7 (23.3%)	7 (23.3%)	4 (13.8%)	6 (20.7%)
$50,000 or More	4 (8.7%)	5 (11.1%)	9 (20.0%)	9 (19.6%)	2 (4.4%)	10 (21.7%)
Don't Know	4 (25.0%)	7 (43.8%)	3 (20.0%)	5 (31.3%)	2 (13.3%)	2 (12.5%)
Medicaid Status						
Medicaid	16 (50.0%)	13 (39.4%)	11 (36.7%)	7 (22.6%)	3 (9.4%)	5 (16.1%)
Non-Medicaid	18 (14.2%)	21 (16.8%)	25 (19.8%)	27 (21.4%)	11 (8.9%)	20 (16.0%)

* Percentages for demographic groups in the follow up column(s) highlighted in **red** are greater by ten percentage points or more compared to the baseline columns. Estimates highlighted in **red** indicate groups that were worse off at follow up compared to baseline. Beneficiaries are displayed according to their baseline demographic group.

Table 30: *2018-2020 Cohort 21 Performance Measurement* Distribution of Positive Depression Screens at Baseline and Follow Up by Baseline Demographic Group for MAO HXXXA

Baseline Demographic	Positive Depression Screen	
	Baseline N (%)	Follow Up* N (%)
MAO HXXXA Total	11 (7.1%)	10 (6.5%)
Age		
65-69	4 (9.5%)	1 (2.4%)
70-74	0	1 (2.2%)
75-79	5 (12.5%)	6 (15.8%)
80-84	2 (11.1%)	2 (10.5%)
85+	0	0
Gender		
Male	4 (5.6%)	5 (6.9%)
Female	7 (8.2%)	5 (6.2%)
Race		
White	8 (6.0%)	7 (5.3%)
Black	2 (22.2%)	0
Other/Unknown	1 (7.7%)	3 (23.1%)
Marital Status		
Married	5 (5.4%)	5 (5.3%)
Widowed	2 (6.1%)	3 (10.0%)
Divorced or Separated	4 (16.0%)	2 (8.3%)
Never Married	0	0
Education		
Did Not Graduate HS	5 (16.1%)	6 (19.4%)
High School Graduate	4 (8.7%)	3 (6.8%)
Some College	0	0
4 Year Degree or Beyond	2 (4.5%)	1 (2.3%)
Annual Household Income		
Less than $10,000	2 (11.1%)	1 (5.9%)
$10,000-$19,999	1 (5.6%)	2 (11.8%)
$20,000-$29,999	0	1 (6.3%)
$30,000-$49,999	3 (10.3%)	3 (10.3%)
$50,000 or More	2 (4.3%)	1 (2.3%)
Don't Know	2 (13.3%)	2 (12.5%)
Medicaid Status		
Medicaid	3 (9.4%)	5 (16.7%)
Non-Medicaid	8 (6.5%)	5 (4.1%)

* Percentages for demographic groups in the follow up column highlighted in **red** are greater by ten percentage points or more compared to the baseline column. Estimates highlighted in **red** indicate groups that were worse off at follow up compared to baseline. Beneficiaries are displayed according to their baseline demographic group.

Table 31: *2018-2020 Cohort 21 Performance Measurement* Distribution of Multiple Chronic Conditions[§] at Baseline and Follow Up by Baseline Demographic Group for MAO HXXXA

Baseline Demographic	Multiple Chronic Medical Conditions[§]	
	Baseline N (%)	Follow Up* N (%)
MAO HXXXA Total	112 (70.9%)	121 (76.6%)
Age		
65-69	26 (61.9%)	31 (73.8%)
70-74	40 (83.3%)	40 (83.3%)
75-79	29 (74.4%)	30 (76.9%)
80-84	11 (55.0%)	12 (63.2%)
85+	6 (66.7%)	8 (80.0%)
Gender		
Male	46 (63.0%)	56 (75.7%)
Female	66 (77.6%)	65 (77.4%)
Race		
White	94 (69.6%)	102 (75.0%)
Black	7 (77.8%)	8 (100%)
Other/Unknown	11 (78.6%)	11 (78.6%)
Marital Status		
Married	66 (71.0%)	70 (73.7%)
Widowed	23 (65.7%)	27 (79.4%)
Divorced or Separated	19 (76.0%)	20 (83.3%)
Never Married	4 (80.0%)	4 (80.0%)
Education		
Did Not Graduate HS	24 (75.0%)	26 (83.9%)
High School Graduate	35 (77.8%)	38 (82.6%)
Some College	25 (69.4%)	28 (77.8%)
4 Year Degree or Beyond	28 (62.2%)	29 (64.4%)
Annual Household Income		
Less than $10,000	14 (73.7%)	14 (82.4%)
$10,000-$19,999	15 (78.9%)	15 (78.9%)
$20,000-$29,999	11 (68.8%)	13 (81.3%)
$30,000-$49,999	21 (70.0%)	22 (73.3%)
$50,000 or More	32 (69.6%)	33 (71.7%)
Don't Know	11 (73.3%)	14 (87.5%)
Medicaid Status		
Medicaid	28 (84.8%)	27 (87.1%)
Non-Medicaid	84 (67.2%)	94 (74.0%)

* Percentages for demographic groups in the follow up column highlighted in **red** are greater by ten percentage points or more compared to the baseline column. Estimates highlighted in **red** indicate groups that were worse off at follow up compared to baseline. Beneficiaries are displayed according to their baseline demographic group.

[§] Multiple chronic medical conditions are defined as having two or more conditions (maximum of 15).

Table 32: *2018-2020 Cohort 21 Performance Measurement* Distribution of Multiple ADL Impairments[§] at Baseline and Follow Up by Baseline Demographic Group for MAO HXXXA

Baseline Demographic	Multiple ADL Impairments[§]	
	Baseline N (%)	Follow Up* N (%)
MAO HXXXA Total	25 (15.7%)	23 (14.6%)
Age		
65-69	0	2 (4.8%)
70-74	7 (14.6%)	5 (10.6%)
75-79	9 (22.5%)	8 (20.5%)
80-84	5 (25.0%)	5 (26.3%)
85+	4 (40.0%)	3 (30.0%)
Gender		
Male	11 (15.1%)	12 (16.7%)
Female	14 (16.3%)	11 (12.9%)
Race		
White	19 (14.0%)	20 (14.8%)
Black	3 (33.3%)	1 (11.1%)
Other/Unknown	3 (21.4%)	2 (15.4%)
Marital Status		
Married	11 (11.7%)	12 (12.9%)
Widowed	11 (31.4%)	8 (23.5%)
Divorced or Separated	2 (8.0%)	1 (4.0%)
Never Married	1 (20.0%)	2 (40.0%)
Education		
Did Not Graduate HS	11 (34.4%)	8 (27.6%)
High School Graduate	9 (19.6%)	7 (14.9%)
Some College	4 (11.1%)	5 (13.9%)
4 Year Degree or Beyond	1 (2.2%)	3 (6.7%)
Annual Household Income		
Less than $10,000	4 (21.1%)	5 (27.8%)
$10,000-$19,999	5 (26.3%)	3 (16.7%)
$20,000-$29,999	4 (25.0%)	2 (13.3%)
$30,000-$49,999	5 (16.7%)	5 (16.7%)
$50,000 or More	3 (6.7%)	4 (8.7%)
Don't Know	3 (18.8%)	4 (25.0%)
Medicaid Status		
Medicaid	13 (39.4%)	8 (25.8%)
Non-Medicaid	12 (9.5%)	15 (11.9%)

* Percentages for demographic groups in the follow up column highlighted in **red** are greater by ten percentage points or more compared to the baseline column. Estimates highlighted in **red** indicate groups that were worse off at follow up compared to baseline. Beneficiaries are displayed according to their baseline demographic group.

[§] Multiple ADL impairments are defined as having two or more impairments.

Table 33: *2018-2020 Cohort 21 Performance Measurement* Mean Number of Unhealthy Physical, Mental, and Activity Limitation Days by Baseline Demographic Group for MAO HXXXA

Baseline Demographic	Physically Unhealthy Number of Days		Mentally Unhealthy Number of Days		Activity Limitations Number of Days	
	Baseline Mean (SD)	Follow Up* Mean (SD)	Baseline Mean (SD)	Follow Up* Mean (SD)	Baseline Mean (SD)	Follow Up* Mean (SD)
MAO HXXXA Total	5.5 (9.4)	3.8 (7.8)	3.5 (7.8)	2.9 (6.2)	3.7 (8.3)	2.9 (6.7)
Age						
65-69	3.0 (6.6)	2.8 (7.7)	2.2 (6.7)	2.1 (4.8)	1.4 (5.0)	1.9 (5.2)
70-74	6.2 (9.7)	4.0 (7.6)	3.1 (6.7)	2.5 (5.8)	4.0 (8.1)	1.7 (4.2)
75-79	5.8 (9.9)	3.5 (6.9)	3.9 (8.2)	3.9 (6.5)	4.2 (9.0)	3.8 (7.7)
80-84	7.6 (11.3)	6.8 (10.9)	5.6 (10.2)	2.6 (7.5)	4.2 (9.5)	6.3 (11.5)
85+	8.4 (10.8)	3.2 (4.7)	5.1 (9.9)	4.6 (9.7)	9.5 (12.3)	2.6 (3.6)
Gender						
Male	6.0 (10.1)	3.2 (7.2)	3.8 (8.6)	2.1 (4.8)	4.6 (9.4)	1.8 (5.5)
Female	5.2 (8.8)	4.4 (8.2)	3.2 (7.1)	3.5 (7.1)	3.0 (7.2)	3.9 (7.5)
Race						
White	4.9 (8.8)	3.4 (7.4)	3.2 (7.3)	2.7 (5.6)	3.2 (7.5)	2.9 (6.6)
Black	12.8 (13.6)	5.6 (9.4)	5.6 (10.5)	0.7 (1.7)	8.5 (13.4)	1.4 (3.3)
Other/Unknown	8.2 (11.0)	7.2 (9.3)	5.8 (11.0)	6.0 (11.6)	6.2 (11.2)	4.3 (9.2)
Marital Status						
Married	4.2 (9.0)	3.7 (8.3)	2.4 (6.7)	1.9 (4.3)	3.0 (8.0)	2.5 (6.7)
Widowed	8.4 (10.2)	5.4 (7.6)	4.7 (8.7)	5.0 (9.0)	5.0 (8.4)	4.0 (7.9)
Divorced or Separated	7.3 (9.5)	2.6 (6.0)	6.4 (9.9)	2.9 (4.8)	5.4 (9.8)	3.0 (4.9)
Never Married	0.0 (0.0)	0.8 (1.1)	1.3 (2.5)	6.0 (13.4)	0.0 (0.0)	3.4 (6.5)
Education						
Did Not Graduate HS	12.2 (12.2)	7.3 (10.5)	8.0 (11.0)	5.4 (9.8)	9.9 (12.2)	6.7 (10.6)
High School Graduate	5.0 (9.2)	3.3 (7.0)	2.5 (6.5)	2.1 (4.9)	2.8 (7.7)	2.4 (6.2)
Some College	3.4 (6.1)	3.5 (7.2)	1.4 (3.8)	3.4 (6.8)	2.4 (4.8)	2.3 (4.4)
4 Year Degree or Beyond	3.5 (7.9)	2.3 (6.2)	3.3 (7.9)	1.7 (2.8)	1.6 (5.8)	1.2 (4.1)
Annual Household Income						
Less than $10,000	10.9 (11.0)	5.4 (7.9)	6.9 (9.8)	3.2 (6.1)	8.8 (11.3)	4.6 (6.0)
$10,000-$19,999	6.9 (10.4)	2.9 (4.2)	3.9 (8.1)	3.0 (7.0)	4.5 (8.1)	2.3 (5.0)
$20,000-$29,999	6.1 (10.2)	6.7 (9.7)	2.3 (5.1)	3.6 (4.8)	4.4 (10.1)	7.1 (10.1)
$30,000-$49,999	5.9 (9.1)	4.4 (8.7)	4.4 (9.2)	2.7 (6.2)	4.0 (7.5)	2.9 (7.7)
$50,000 or More	4.2 (8.8)	2.8 (7.8)	3.1 (8.2)	2.1 (5.2)	2.3 (7.5)	1.1 (4.1)
Don't Know	3.2 (8.5)	4.6 (9.3)	2.5 (5.4)	6.6 (10.0)	2.5 (8.0)	5.3 (9.4)
Medicaid Status						
Medicaid	12.3 (11.6)	5.8 (8.4)	7.7 (10.0)	5.0 (9.7)	10.0 (11.4)	4.5 (7.4)
Non-Medicaid	3.9 (8.0)	3.3 (7.6)	2.5 (6.8)	2.4 (4.9)	2.2 (6.5)	2.5 (6.5)

* Means for demographic groups in the follow up column(s) highlighted in **red** are greater by ten percent or more compared to the baseline columns. Estimates highlighted in **red** indicate groups that were worse off at follow up compared to baseline. Beneficiaries are displayed according to their baseline demographic group.

Table 34: *2018-2020 Cohort 21 Performance Measurement* Distribution of BMI Categories by Baseline Demographic Group for MAO HXXXA

Baseline Demographic	Underweight (<18.5 BMI)		Obese (≥30 BMI)	
	Baseline N (%)	Follow Up* N (%)	Baseline N (%)	Follow Up* N (%)
MAO HXXXA Total	1 (0.7%)	0	52 (34.9%)	52 (34.2%)
Age				
65-69	0	0	18 (42.9%)	13 (33.3%)
70-74	0	0	15 (35.7%)	20 (43.5%)
75-79	1 (2.6%)	0	12 (30.8%)	11 (28.2%)
80-84	0	0	6 (35.3%)	7 (38.9%)
85+	0	0	1 (11.1%)	1 (10.0%)
Gender				
Male	0	0	24 (35.3%)	26 (35.6%)
Female	1 (1.2%)	0	28 (34.6%)	26 (32.9%)
Race				
White	1 (0.8%)	0	45 (35.2%)	44 (33.3%)
Black	0	0	3 (37.5%)	4 (50.0%)
Other/Unknown	0	0	4 (30.8%)	4 (33.3%)
Marital Status				
Married	0	0	32 (36.8%)	34 (36.6%)
Widowed	0	0	9 (25.7%)	8 (25.0%)
Divorced or Separated	1 (4.5%)	0	8 (36.4%)	6 (27.3%)
Never Married	0	0	3 (60.0%)	4 (80.0%)
Education				
Did Not Graduate HS	0	0	16 (53.3%)	16 (57.1%)
High School Graduate	1 (2.4%)	0	15 (35.7%)	18 (40.0%)
Some College	0	0	9 (25.7%)	7 (20.0%)
4 Year Degree or Beyond	0	0	12 (28.6%)	11 (25.0%)
Annual Household Income				
Less than $10,000	0	0	7 (41.2%)	5 (31.3%)
$10,000-$19,999	1 (5.3%)	0	6 (31.6%)	6 (35.3%)
$20,000-$29,999	0	0	6 (37.5%)	6 (37.5%)
$30,000-$49,999	0	0	6 (24.0%)	8 (27.6%)
$50,000 or More	0	0	14 (32.6%)	14 (31.1%)
Don't Know	0	0	9 (56.3%)	9 (56.3%)
Medicaid Status				
Medicaid	1 (3.3%)	0	13 (43.3%)	14 (48.3%)
Non-Medicaid	0	0	39 (32.8%)	38 (30.9%)

* Percentages for demographic groups in the follow up column(s) highlighted in **red** are greater by ten percentage points or more compared to the baseline columns. Estimates highlighted in **red** indicate groups that were worse off at follow up compared to baseline. Beneficiaries are displayed according to their baseline demographic group.

Appendix 1

Program Background

This section introduces the Medicare HOS, survey administration, and the calculation of outcomes for the performance measurement. A complete description of the HOS program, the program timeline, the HOS 3.0 instrument, previous survey results, and supporting documents are available on the HOS website at www.HOSonline.org.

CMS is committed to monitoring the quality of care provided by MAOs. The HOS results continue to be an important part of the CMS quality improvement activities, ensuring that medical care paid for under the Medicare program meets professionally recognized standards of health care. Section 722 of the Medicare Prescription Drug, Improvement, and Modernization Act of 2003 (MMA) mandates collecting, analyzing, and reporting health outcomes information. This legislation also specifies that data collected on quality, outcomes, and beneficiary satisfaction to facilitate consumer choice and program administration must use the same types of data that were collected prior to November 1, 2003. Collected since 1998, the Medicare HOS is the first patient-reported outcomes measure in Medicare managed care, and therefore remains a critical part of assessing MAO quality. In addition, CMS includes the HOS results as one component of their performance assessment program.

The goal of the Medicare HOS program is to gather valid and reliable clinically meaningful data for uses such as: targeting quality improvement activities and resources; monitoring health plan performance; rewarding top-performing health plans; helping beneficiaries make informed health care choices; and advancing the science of functional health outcomes measurement. This Performance Measurement Report is part of a larger CMS effort to increase the health care industry's capacity to improve the health status of its Medicare population. The results are intended to help MAOs identify areas for potential improvement. The HOS Performance Measurement Report is made available to all participating MAOs after each annual follow up cohort data collection is completed.

2018-2020 Medicare Advantage Organization Participation

MAOs with Medicare contracts in effect on or before January 1, 2017, and a minimum enrollment of 500 beneficiaries were required to report the Baseline HOS in 2018:

- All MAOs, including all coordinated care plans, local and regional preferred provider organizations (PPO), Private Fee-for-Service (PFFS) and Medical Savings Account (MSA) contracts
- Section 1876 cost contracts, even if closed for enrollment
- Employer/union only contracts
- Medicare-Medicaid Plans (MMP)

MAOs that administered the HOS Baseline Survey in 2018 were required to administer the HOS Follow-Up Survey in 2020. In the event of a consolidation, merger, or novation, the surviving contract had to report Follow Up HOS for all members of all contracts involved. All eligible members of these contracts were resurveyed and the results were reported as one under the surviving contract. For a contract conversion, the contract had to report if its new organization type was required to report. Refer to the list of participating MAO contracts available in the Survey Results section on the Survey page of the HOS website (www.HOSonline.org).

All Program of All-Inclusive Care for the Elderly (PACE) organizations with Medicare contracts in effect on or before January 1, 2019, and with a minimum enrollment of 30 beneficiaries as of October 1, 2019, were required by CMS to administer the HOS-Modified (HOS-M) in 2020.

MAOs sponsoring Fully Integrated Dual Eligible (FIDE) Special Needs Plans (SNPs) within Medicare contracts in effect on or before January 1, 2019, and with a minimum enrollment of 50 beneficiaries could elect to report HOS or HOS-M at the plan benefit package (PBP) level for a frailty assessment under the Affordable Care Act. The assessment determined eligibility for a frailty adjustment payment, similar to the payments provided to PACE programs, for FIDE SNPs with similar average level of frailty to PACE. For the 2020 survey year, plans were permitted to choose whether their assessments would be calculated based on ADLs reported in the HOS or on a separate sample of beneficiaries who completed the HOS-M. Voluntary reporting for frailty assessment at the FIDE SNP level is in addition to standard HOS requirements for quality reporting at the contract level.

Cohort 21 Baseline Sampling

- MAOs with fewer than 500 beneficiaries were not required to report HOS.
- For MAOs with populations of 500 to 1,200 beneficiaries, all eligible beneficiaries were included in the sample.
- For MAOs with more than 1,200 beneficiaries, a simple random sample of 1,200 beneficiaries was selected.
- Beneficiaries were defined as eligible if they were 18 years or older on the date the sample was drawn. The six months enrollment requirement was waived beginning in 2009, and beneficiaries with End Stage Renal Disease (ESRD) were no longer excluded from the sampling beginning in 2010.

Cohort 21 Follow Up Sampling

- Beneficiaries were eligible for remeasurement if they had sufficient data to derive PCS or MCS scores at baseline and were enrolled in their original contract when the follow-up sample was drawn.
- Beneficiaries were excluded from follow up if they were no longer enrolled in their original MAO when the follow-up sample was drawn or died after the baseline survey. Although deceased beneficiaries were excluded from the sample, CMS includes deceased baseline respondents when calculating the HOS performance measurement results.[5]

Survey Administration

- MAOs contracted with a CMS approved survey vendor to administer the surveys following the protocols specified in the HEDIS 2018 and 2020, Volume 6: Specifications for the Medicare Health Outcomes Survey manuals. The manuals detailed the methods for mail, telephone, and mixed methods of data collection.
- The mail component of the surveys used prenotification letters, a standardized questionnaire, survey letters, and reminder/thank you postcards. Sample respondents completed the HOS in English, Spanish, Chinese, or Russian language versions of the mail survey. While no surveys were completed in Russian for *Cohort 21 Follow Up*, the Russian language option became available in 2019.
- Survey vendors attempted telephone follow up in English, Spanish, or Chinese (with at least six attempts) in those instances when beneficiaries failed to respond after the second mail survey or returned an incomplete mail survey, in order to obtain responses for missing items. The Chinese language telephone protocol was added to the HOS in 2020. A standardized version of an Electronic Telephone Interviewing System script was used to collect telephone interview data for the survey.
- Survey vendors performed initial data cleaning and follow up with survey respondents, as necessary.

Additional information about *Cohort 21* sampling and survey administration can be found in the NCQA HEDIS 2018 and 2020 Volume 6 manuals.[5,6]

HOS Data Collection Tools

The core HOS health status items were collected with the same instrument for the *2018 Cohort 21 Baseline* and *2020 Cohort 21 Follow Up*. Since 2006, the HOS has incorporated the Veterans RAND 12-Item Health Survey (VR-12).

Medicare HOS 3.0 Instruments

The 2018 and 2020 survey administrations used the HOS 3.0 that was implemented in 2015. The HOS 3.0 evaluates the HRQOL of MA beneficiaries by measuring their physical and mental health status using the VR-12.[55] The HOS contains questions about socio-demographics, ADLs, IADLs, chronic medical conditions, self-rated health, number of unhealthy days in the past 30 days, depression risk, cognitive functioning, memory, pain, living arrangements, and self-reported height and weight used for calculation of BMI. Four HEDIS Effectiveness of Care measures are included to evaluate management of urinary incontinence, physical activity, osteoporosis testing, and fall risk management. Questions regarding race, ethnicity, sex, primary language, and disability status comply with standards established by Section 4302 of the Affordable Care Act. The HOS 3.0 includes changes to questions about leakage of urine, osteoporosis testing in older women, sleep duration and quality, and primary language spoken in the home. In a formatting change, the survey uses a two column layout for each page. The HOS survey instruments are available on NCQA's website at www.ncqa.org/hedis/measures/hos.

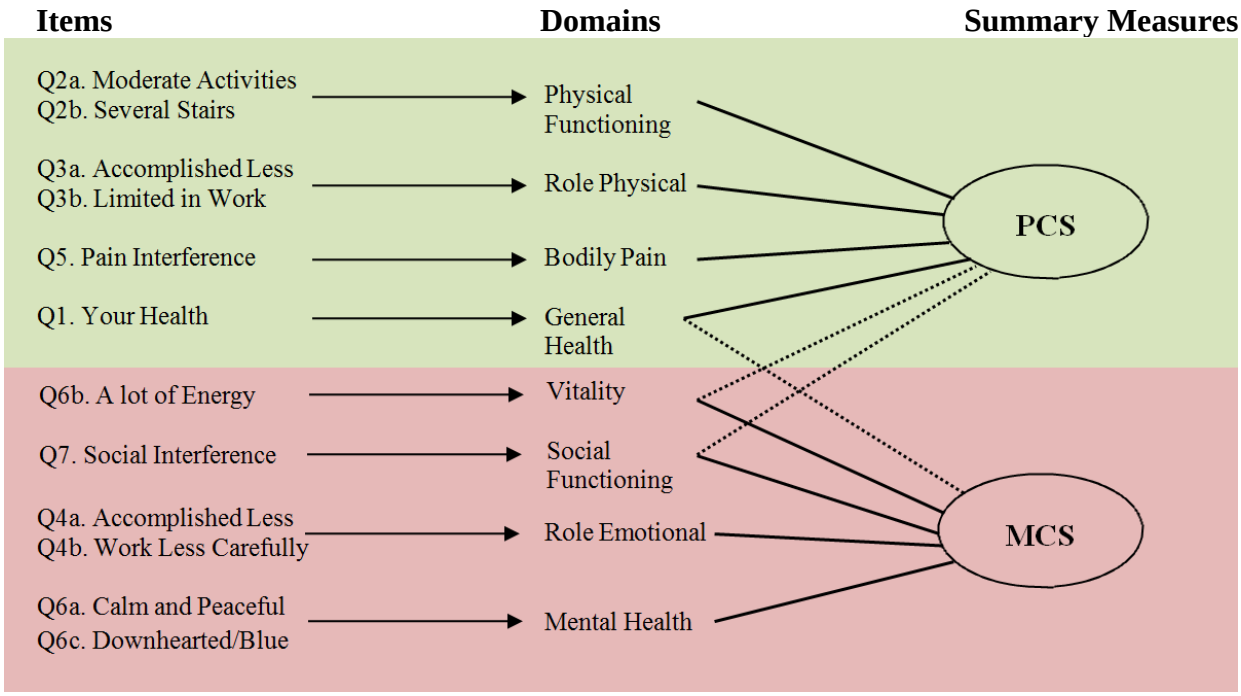
The VR-12 was derived from the Veterans RAND 36-Item Health Survey (VR-36).[56,57,58] The VR-12 is a generic, multipurpose health survey, which consists of the 12 most important items from the VR-36 for construction of the physical and mental health summary scores (Q1-Q7) and two items that assess change in physical and emotional health compared with one year ago (Q8 and Q9) that are not used in the calculation of the summary scores. The shorter instrument was adopted to reduce response burden

and survey costs, while maintaining comparability of HOS results over time. The body of literature supports the shorter survey as a reliable and valid substitute for the 36-item health survey. In addition, conversion formulas have been developed and validated for comparison of the VR-12 with the earlier 36-item survey.[59]

In comparison with the earlier 36-item survey, two modifications were made in the VR-12. The first modification was an increase in the number of response choices for the items used for role limitations due to physical problems (Q3a and Q3b) and role limitations due to emotional problems (Q4a and Q4b) from a two-point choice of "Yes" or "No" to a five-point Likert scale ("No, none of the time," "Yes, a little of the time," "Yes, some of the time," "Yes, most of the time," and "Yes, all of the time"). The role-physical questions assess whether respondents' physical health limits them in the kind of work or other usual activities they perform, while the role-emotional questions assess whether emotional problems have caused respondents to accomplish less in their work or other usual activities. The second modification was that two questions were used to assess health change, one focusing on physical health (Q8) and one on emotional problems (Q9), in contrast to the one general change item in the 36-item survey.[60,61]

The VR-12 measures the same eight health domains as the 36-item health survey: 1) Physical Functioning, 2) Role-Physical, 3) Role-Emotional, 4) Bodily Pain, 5) Social Functioning, 6) Mental Health, 7) Vitality, and 8) General Health. Each domain aggregates one or two items and all eight domains are used to calculate the two summary measures, as illustrated in the VR-12 mapping model that follows in Figure 4.

Figure 4: Mapping of HOS VR-12 to 8 Health Domains and 2 Summary Measures



Note: Domains contributing the most to each summary measure are indicated by a solid line. Domains contributing to a lesser degree are indicated by a broken line; however, all domains contribute to some extent to the scoring of both summary measures (PCS and MCS).

Physical and Mental Component Summary Scores

The baseline and follow up PCS and MCS scores were calculated from the VR-12 using the Modified Regression Estimate (MRE) for scoring and for imputation of missing data.[55] These are the unadjusted scores that will be used to create the final adjusted change scores that are discussed in the Calculation of Outcomes below.

First, for those beneficiaries with complete responses across the VR-12, the following steps[62] were taken to calculate the scores:

- Step One: New variables were created for each response level choice with one level omitted. Using the 59 total response categories across the VR-12 questions, 47 indicator variables were created.
- Step Two: Aggregate PCS and MCS scores were created separately from a regression equation that weighted each of the 47 indicator variables. The weights were derived from the Veterans SF-36 PCS and MCS Scales using the 1999 Large Health Survey of Veteran Enrollees.[63]
- Step Three: A constant was added to each of the estimates obtained from Step Two. The scores were then standardized using normative values from a 1990 U.S. general population. Therefore a mean score of 50 represents the national average, a 10-point difference above and below the mean score is one standard deviation, and with few exceptions, the scores have a range of 0 through 100 (higher being better).

Second, the PCS and MCS scores were imputed using the MRE when beneficiary data was missing across any of the VR-12 items. Using the MRE algorithm, PCS and MCS scores can be calculated in as many as 90% of the cases in which one or more VR-12 responses are missing.[64] Depending on the pattern of missing item responses for a beneficiary, a different set of regression weights was required to compute that individual's PCS and/or MCS scores.[62] For each combination of missing data, the beneficiaries' data were merged with the stored regression weights and the PCS or MCS scores were computed and then standardized using the normative values from MRE Step Three.

Beneficiary PCS and MCS results were mode adjusted for the impact of telephone administration compared to the reference mode of mail administration. Comparisons across the VR-12 of matched HOS and Veterans Administration surveys for the same respondents showed that PCS and MCS scores were, on average, 1.9 and 4.5 points greater respectively for telephone compared with mail administered surveys.[65] Therefore, for telephone surveys, 1.9 points were subtracted from the PCS score and 4.5 points were subtracted from the MCS score.

For the physical health summary measure, very high scores indicate no physical limitations, disabilities, or decline in well-being; high energy level; and a rating of health as "excellent." For the mental health summary measure, very high scores indicate frequent positive affect, absence of psychological distress, and no limitations in usual social and role activities due to emotional problems.

Data Evaluation and Processing

The entire HOS data file was reviewed to verify the presence of unique beneficiary records. Additional reviews of the data are performed using the complete HOS data file, as well as subsets of the data (e.g., mode of administration, survey vendor, and survey language).

- Data consistency checks are performed to identify:
    - Out of range dates and response values
    - Duplicate Beneficiary Link Keys and Medicare Beneficiary Identifier (MBI) numbers

    - Data shifts in value assignment
    - Inconsistencies in data distributions of survey response values among survey vendors
    - Discrepancies in the percent complete and survey disposition codes
    - Inconsistent assignment of survey variables (such as survey disposition, round number, and survey language)
    - Patterns of missing responses across MAO data
- Response consistency checks between related items are performed to validate the integrity of the data.
- Date variables are converted to a SAS®[N] date format to facilitate the calculation of duration of enrollment and age, which are then stored in the data file.
- For the performance measurement, baseline and follow up data are evaluated and merged, and additional variables are calculated or obtained from other CMS data sources.

Calculation of Outcomes

The *2018-2020 Cohort 21 Performance Measurement* Report incorporates results from the 2018 HOS 3.0 for the baseline and the 2020 HOS 3.0 for the follow up survey administrations. The outcomes of the performance measurement analysis were death, change in physical health as measured by the PCS score, and change in mental health as measured by the MCS score. For the HOS results, death and PCS outcomes were combined into one overall measure of change in physical health. Thus, there are two primary outcomes: (1) Alive and PCS better or same (vs. PCS worse or death), and (2) MCS better or same (vs. MCS worse). These outcomes are designated as the primary outcomes of interest since health maintenance, rather than improvement, is a realistic clinical goal for many seniors.

The final adjusted physical and mental health measures are based on the case-mix adjusted PCS and MCS change scores derived from the baseline and follow up surveys, as well as death status. Multivariate logistic regression models were used for case-mix adjustment, and to calculate expected outcomes for each beneficiary. Case-mix adjustments were used so that all MAOs were as comparable as possible in terms of socio-demographic characteristics (age, gender, race, etc.), chronic conditions, baseline health status, and other design variables. Further details about the HOS variables (e.g., race and ethnicity) are included in the PM Data Users Guide (DUG) that is provided to MAOs with their requested data or refer to the online document available on the Data Users Guides page of the HOS website at www.HOSonline.org.

For expected outcomes, the probability of being better or worse was calculated using statistical models that take into account the demographic and socioeconomic variables and other covariates. The expected outcomes were death, “PCS better or same,” and “MCS better or same.” For calculating expected outcomes, separate case-mix models were warranted for death, PCS scores, and MCS scores.

A series of 12 different models (six death models, three PCS models and three MCS models) were applied, since not all beneficiaries had data for all of the independent variables that could be used to calculate an expected score. In other words, each expected outcome for a beneficiary was based on those variables for which the beneficiary had data. For example, if a beneficiary had all of the required independent variables for Model A (the model containing the highest number of independent variables), then their expected score was calculated using that model. If not, then Model B (the model containing the second highest number of independent variables) was used if all of the required independent

[N] SAS® is a registered trademark of SAS Institute Inc., Cary, NC.

variables for this model were available, and so on. One model was used to calculate an expected outcome for each beneficiary.

Death Models

All beneficiaries age 65 or older, who completed the HOS at baseline with a PCS or MCS score, and whose MAO participated in the HOS at follow up were included in the analysis of death outcomes (i.e., analytic sample).

Models used to predict the probability of death for each beneficiary included variables to control for baseline differences in demographic and socioeconomic characteristics, chronic medical conditions, and functional status. Demographic and socioeconomic variables included age, gender, race, education, marital status, annual household income, home ownership, Medicaid status, and eligibility for Supplemental Security Income (SSI). The CMS reason for Medicare entitlement field, which has categories of disability, is used as a proxy for SSI eligibility. Chronic medical conditions were measured with a checklist of 14 conditions and four indicators of current cancer treatment. Conditions were grouped into four categories that were strong, moderate, weak, and negative predictors of death, for models in which the individual chronic medical condition data were incomplete. Additional variables considered for the models included the baseline item about general health compared to others, the six ADL items, the individual VR-12 response items, and the baseline PCS and MCS scores. For example, functional status was measured using a combined VR-12 physical functioning/ADL scale, the individual VR-12 response items, and the baseline item about general health compared to others. Baseline PCS and MCS were used when VR-12 response items were incomplete (see Table A1 in this Appendix for detailed information about covariates used in each of the six death models).

PCS and MCS Models

Beneficiaries age 65 or older, who completed the HOS at baseline and follow up, for whom PCS and/or MCS scores could be computed at both time points, and who remained in their original MAO at the time of follow up sampling were included in the analysis of PCS and MCS outcomes (i.e., respondent sample).

There are two major steps in the scoring for the PCS and MCS outcomes. The first step is to calculate the unadjusted PCS and MCS scores from the VR-12 set of questions that are embedded in the HOS 3.0 questionnaire. The second step is to calculate the adjusted change scores for the HOS Performance Measurement analysis. Models used to predict expected change in PCS and MCS scores (e.g., PCS better or same) used a set of exogenous demographic and socioeconomic variables at baseline, such as age, gender, race, education, marital status, annual household income, home ownership, Medicaid status, and SSI (see Table A2 in this Appendix for detailed information about the three PCS models and three MCS models). Because each beneficiary served as his or her own control for the PCS and MCS analysis, substantial case-mix was already reflected in the baseline PCS or MCS scores. Sensitivity analyses determined that further adjustment for chronic medical conditions at baseline was not warranted, because errors in disease reporting were correlated with functioning.

Tables displaying coefficients from the series of 12 multivariate logistic regression models (six death models, three PCS models, and three MCS models) that were used to case-mix adjust HOS outcomes and to calculate expected outcomes for each beneficiary, "Medicare HOS Performance Measurement Coefficient Tables" are available from the Survey Results page on the HOS website at www.HOSonline.org.

Calculation of MAO-Level Results

Calculation of the overall MAO-level results was completed by creating an actual death indicator for each beneficiary in the MAO analytic sample who died during the two-year follow up (actual death=1) and who survived (actual death=0). The actual physical and mental health indicators were also created for each beneficiary in the MAO respondent sample, to indicate whether the PCS score and MCS score were better, the same, or worse at the two-year follow up. The PCS score is considered to be the same if it changed by less than 5.66 points (plus or minus) between baseline and follow up survey administrations. A change greater than 5.66 points (plus or minus) is outside of the 95% confidence interval for an individual beneficiary, as estimated from the standard deviation and reliability of the PCS score. The MCS score is considered to be the same if it changed by less than 6.72 points (plus or minus). For the MAO level, the mean actual death rate (A_d), mean actual "PCS better or same" rate (A_{psb}) and mean actual "MCS better or same" rate (A_{msb}) were then summarized for the MAO. The mean actual "Alive and PCS better or same" rate is $(1-A_d)*A_{psb}$.

An expected death rate, an expected PCS better or same rate, and an expected MCS better or same rate were calculated for each beneficiary within the MAO respondent sample using logistic regression models for the case-mix adjustment. To summarize data for the outcome "Alive and PCS better or same," the mean expected death rate (E_d) was calculated, along with the mean expected "PCS better or same" rate (E_{psb}). The mean expected "Alive and PCS better or same" rate for the MAO is $(1-E_d)*E_{psb}$. For the MAO level, data were summarized for the mean expected "MCS better or same" rate (E_{msb}). Expected outcomes for "PCS better" and "MCS better" were also needed to calculate the percentage of beneficiaries who were better, the same, or worse on each measure. The percentage of beneficiaries who were worse at follow up is calculated as 1 minus the percentage who were better or the same. Beneficiary-level actual and expected results are then aggregated, and the resulting scores are used to derive the MAO-level Improving or Maintaining Physical Health (PCS better or same) and Improving or Maintaining Mental Health (MCS better or same) measures that are reported in the Medicare Part C Star Ratings.

HOS outcomes were analyzed by calculating the national averages, and the differences between actual and expected MAO level results for death, PCS, and MCS over two years. For example, the difference between actual and expected results indicates the percentage points by which the MAO's actual "Alive and PCS better or same" rate was higher (for a positive difference) or lower (for a negative difference) than expected results. A *t* statistic, expressing the significance of the MAO differences from the average national results, was calculated by dividing the MAO deviation by the standard error. A *t* statistic plus or minus 2.0 or larger was considered significant, as long as an overall *F* test indicated that the MAOs differed on the outcome of interest (discussed below). An adjusted MAO percentage of "Alive and PCS better or same" also was calculated by combining the overall (national) results and the MAO deviation score, using a logit transformation. Similar logic was used to calculate adjusted MAO percentages for "Alive and PCS better," "MCS better or same," and "MCS better."

Tests of Significance for MAO-Level Differences

For physical health (mortality and PCS) over the two-year follow up period, overall *F* tests are conducted to determine if mortality, "PCS better or same" and "PCS better" are significantly different at the MAO level. If both "Death" and "PCS better or same," which when combined are specified *a priori* as the primary physical health outcome of "Alive and PCS better or same," differ significantly at the MAO level, an outlier analysis for PCS is warranted. The PCS outlier analysis is performed using a *t-test* at the MAO level. MAOs with a *t* statistic ≥ 2.0 are designated as a better than expected outlier for

the physical health measure, while MAOs with a *t* statistic ≤ -2.0 are identified as a worse than expected outlier, compared to the national average. If the *F* test for "Death" or "PCS better or same" is not significant, the *t-test*s are not warranted and all MAOs are designated as the same, when compared to the national average. The "Alive and PCS better or same" measure is the combined Physical Health Percent Better+Same result in Table 7 in the *Cohort 21 Performance Measurement* Results section and is used as the Medicare Star Ratings measure for *Improving or Maintaining Physical Health*.

For the two-year follow up period for mental health (MCS), an overall *F* test is conducted to determine if "MCS better or same" and "MCS better" are significantly different at the MAO level. If "MCS better or same," which is specified *a priori* as the primary mental health outcome, differs significantly at the MAO level, an outlier analysis for MCS is warranted. The MCS outlier analysis is also performed using a *t-test* at the MAO level. MAOs with a *t* statistic ≥ 2.0 are designated as a better than expected outlier for the mental health measure, while MAOs with a *t* statistic ≤ -2.0 are identified as a worse than expected outlier, compared to the national average. If the *F* test for "MCS better or same" is not significant, the *t-test*s are not warranted and all MAOs are designated as the same, when compared to the national average. The "MCS better or same" measure is the combined Mental Health Percent Better+Same result in Table 8 in the *Cohort 21 Performance Measurement* Results section and is used as the Medicare Star Ratings measure for *Improving or Maintaining Mental Health*.

Please note: The information presented here will permit an MAO to closely approximate its expected PCS better or same (without death) and expected MCS better or same results. However, exact replication of the final MAO-level Alive and PCS better or same results may not be possible since MAOs do not have access to records of disenrolled beneficiaries that are included in the case-mix adjustment for death, which is used for the PCS results.

Table A1: Covariates Used in Estimation of Expected Mortality

	Death Model					
Death Model Covariates	**A**	**B**	**C**	**D**	**E**	**F**
Demographic and Socioeconomic Variables at Baseline						
Age (linear), Age 75+, Age 85+	√	√	√	√	√	√
Gender	√	√	√	√	√	√
Age and Gender interaction	√	√	√	√	√	√
HOS Race/Ethnicity (Asian, Black/African-American, Hispanic, Native American, Pacific Islander, Multiracial)	√	√				
CMS Race/Ethnicity (Asian, Black/African-American, Hispanic, Native American, Other, Unknown)			√	√	√	√
Receive Medicaid or do not receive Medicaid	√	√	√	√	√	√
Eligible or not for Supplemental Security Income (SSI) due to disability	√	√	√	√	√	√
Home owner or non-home owner	√	√				
High school graduate or not high school graduate	√	√				
Married or not married (single, divorced, widowed, separated)	√	√				
Annual household income less than $20,000 or annual household income of $20,000 or greater	√	√				
Chronic Medical Conditions at Baseline						
Presence or absence of each of 14 chronic medical conditions: hypertension, myocardial infarction, angina/coronary artery disease, congestive heart failure, other heart conditions, stroke, pulmonary disease, gastrointestinal disorders, arthritis of hip or knee, arthritis of hand or wrist, sciatica, diabetes, depression, any cancer other than skin cancer	√					
Treatment or non-treatment for 4 cancer types: colon/rectal, lung, breast, prostate	√					
Mean of regression coefficients in 4 condition groups with varying relationships to death: 1. Strong relationship (congestive heart failure, any cancer, colon/rectal cancer, lung cancer) 2. Moderate relationship (pulmonary disease, stroke, diabetes) 3. Weak relationship (myocardial infarction, depression, hypertension, angina/coronary artery disease, other heart conditions) 4. Negative relationship (breast cancer, gastrointestinal disorders, arthritis [both types], sciatica, prostate cancer)		√	√	√		
Baseline Functional Status						
Physical Functioning/Activities of Daily Living Scale	√	√	√			
General Health item (health is excellent, very good, good, fair, poor)	√	√	√			
Physical Functioning item (limitations in moderate activities)	√	√	√			
Physical Functioning item (limitations climbing several flights of stairs)	√	√	√			
Role-Physical item (accomplished less than would like)	√	√	√			
Role-Physical item (limited in the kind of work or other activities)	√	√	√			
Role-Emotional item (accomplished less than would like)	√	√	√			
Role-Emotional item (didn't do work or other activities as carefully)	√	√	√			
Bodily Pain item (pain interfered with normal work)	√	√	√			
Mental Health item (felt calm and peaceful)	√	√	√			
Vitality item (had a lot of energy)	√	√	√			
Mental Health item (felt downhearted and blue)	√	√	√			
Social Functioning item (health interfered with social activities)	√	√	√			
One-item measure of General Health compared to others	√	√	√			
Baseline PCS and MCS				√	√	

Table A2: Covariates Used in Estimation of Change in PCS and MCS Scores

	PCS Model			MCS Model		
PCS/MCS Model Covariates at Baseline	**A**	**B**	**C**	**A**	**B**	**C**
Age (linear), Age 75+, Age 85+	√	√	√	√	√	√
Gender	√	√	√	√	√	√
Age and Gender interaction	√	√	√	√	√	√
HOS Race/Ethnicity (Asian, Black/African-American, Hispanic, Native American, Pacific Islander, Multiracial)	√	√		√	√	
CMS Race/Ethnicity (Asian, Black/African-American, Hispanic, Native American, Other, Unknown)			√			√
Receive Medicaid or do not receive Medicaid	√	√	√	√	√	√
Eligible or not for Supplemental Security Income (SSI) due to disability	√	√	√	√	√	√
Home owner or non-home owner	√	√		√	√	
High school graduate or not high school graduate	√	√		√	√	
Married or not married (single, divorced, widowed, separated)	√	√		√	√	
Annual household income less than $20,000 or annual household income of $20,000 or greater	√			√		

Appendix 2

HOS Partners

CENTERS FOR MEDICARE & MEDICAID SERVICES (CMS)

Address:
7500 Security Boulevard
Baltimore, MD 21244-1850

HOS websites:
www.cms.gov/Research-Statistics-Data-and-Systems/Research/HOS/index.html

www.HOSonline.org

HOS Email:
hos@cms.hhs.gov

The Health Outcomes Survey (HOS) Team at the Centers for Medicare & Medicaid Services (CMS) is responsible for leadership, oversight, coordination, and successful implementation of the national Medicare Health Outcomes Survey Program.

The HOS team directs and coordinates the work of various program partners. The survey implementation and operations contractors include the National Committee for Quality Assurance (NCQA), Research Triangle Institute (RTI) International, and the Center for the Assessment of Pharmaceutical Practices (CAPP), formerly Health Outcomes Technologies Program (HOT), of the Boston University School of Public Health. The data analysis, dissemination, education, and applied research contractor is Health Services Advisory Group (HSAG).

CENTER FOR THE ASSESSMENT OF PHARMACEUTICAL PRACTICES (CAPP), FORMERLY HEALTH OUTCOMES TECHNOLOGIES PROGRAM (HOT)

Health Policy & Management Department, Boston University School of Public Health

Address:
715 Albany Street (T-3W)
Boston, MA. 02118

Phone: (617) 414-1418
Fax: (617) 638-5374

CAPP website:
www.bu.edu

Survey website:
www.bu.edu/sph/about/departments/health-law-policy-and-management/research/vr-36-vr-12-and-vr-6d

CAPP at the Boston University (BU) School of Public Health was launched in 1998. The principal goals of CAPP are to advance the use of patient-centered assessments of health to improve health outcomes and to advance research efforts in the areas of health outcomes, cost-effectiveness analysis, technology assessment, disease management, pharmaceutical administration, and health care policy. CAPP has integrated patient-centered measures with extensive pharmaceutical and health services databases. CAPP has led several major projects in the VA involving the development of the Veterans RAND 36-Item Health Survey (VR-36), which is modified from the MOS SF-36 to provide greater precision and reliability than the original version. Well over 2 million administrations of the VR-36 have occurred in the VA since 1996. A shorter version of the VR-36, the Veterans RAND 12-Item Health Survey (VR-12), has also been developed by CAPP and administered to over 3.0 million users both inside and outside the VA. These assessments have contributed to the outcomes management system in the VA. The VR-12 is the principal outcome in HOS.

The work of the CAPP program is driven by an increased demand for new patient-based assessment tools and methodologies that can be used for clinical management and for monitoring the quality, efficiency, and effectiveness of patient care.

CAPP's staff have been engaged in several collaborative projects for the HOS, including comparisons of health outcomes between the HOS and the VA. The purpose of this study was to examine the differences in the outcomes of care for the HOS compared with the VA. Analyses included psychometric comparisons of a 36-item Health Survey between HOS and VA, and an examination of the differences of the disease burden of patients seen in the HOS systems of care compared with those veterans seen within the VA. A recent study examined the quality of care using medication data from the Medicare Part D data base merged with VR-12 outcomes from the HOS survey. The group has also developed imputation programs for the HOS to deal with missing values using the MOS SF-36 Version 1.0, the VR-36, and the VR-12, as well as risk adjustment models.

HEALTH SERVICES ADVISORY GROUP, INC. (HSAG)

Address:
3133 East Camelback Road
Suite 100
Phoenix, AZ 85016

Phone: (602) 801-6600
Fax: (602) 241-0757

Website:
www.hsag.com

HOS Information and Technical Support Telephone Line:
(888) 880-0077

HOS Information and Technical Support Email:
hos@hsag.com

Originally established in 1979, HSAG has grown into a multi-state Quality Innovation Network-QIO (QIN-QIO), External Quality Review Organization (EQRO), and End-Stage Renal Disease (ESRD) Network.

As the QIN-QIO for Arizona and California, HSAG collaborates with patients, families, caregivers, hospitals, nursing homes, home health agencies, physician offices, and other stakeholders in order to improve healthcare. QIN-QIOs work with communities and providers on strategic initiatives and projects to implement improvements in the quality of care available throughout the spectrum of care. QIN-QIO projects drive quality by providing technical assistance, convening learning and action networks for sharing best practices, and collecting and analyzing data for improvement.

HSAG has more than 30 years of experience performing external quality review (EQR) activities, and provides EQR-like services in 18 states. HSAG works collaboratively with the state Medicaid agencies for which it performs EQR services to help improve the quality of care provided to Medicaid recipients. Moreover, HSAG collaborates with each state's staff to develop state quality improvement plans and to design initiatives that will result in measurable outcomes.

In its role as an ESRD Network, HSAG provides quality improvement, data management, grievance investigation, technical assistance, and patient and professional education services for providers and patients in multiple states. The goal of the ESRD Network is to efficiently and effectively increase the quality of care and quality of life for ESRD patients.

HSAG is an NCQA HEDIS® Certified Survey Vendor and NCQA Licensed Organization.

HSAG has been CMS' data analysis, dissemination, education, and applied research contractor for the Medicare HOS program since 1998.

NATIONAL COMMITTEE FOR QUALITY ASSURANCE (NCQA)

Address:
1100 13th Street, NW
Third Floor
Washington, DC 20005

Phone: (202) 955-3500
Fax: (202) 955-3599

Email:
HOS@ncqa.org

Website:
www.ncqa.org

NCQA has served as the CMS contractor for implementing the Healthcare Effectiveness Data and Information Set (HEDIS®) Medicare HOS since the survey's inception in 1997. In this capacity, NCQA:

- Manages the data collection and transmittal of the HOS data.
- Evaluates and trains CMS-approved HOS survey vendors and conducts ongoing quality oversight of the survey process.
- Develops, evaluates, and refines quality measures for the HOS.
- Publishes the *HEDIS Volume 6: Specifications for the Medicare Health Outcomes Survey*, which contains the technical specifications for the measure and survey protocol.
- Provides CMS, Medicare Advantage Organizations (MAOs), and interested parties with technical assistance, and materials related to the HOS measures.

NCQA is a private, non-profit organization dedicated to improving health care quality. NCQA's website (www.ncqa.org) contains information to help consumers, employers and others make more informed health care choices.

NCQA accredits and certifies a wide range of health care organizations, recognizes clinicians and clinician groups in key areas of performance, and manages the evolution of HEDIS, the tool the nation's MAOs use to measure and report on their performance. There are more than 90 different measures in HEDIS, which provide purchasers and consumers with the information they need to reliably compare the performance of managed care plans.

RESEARCH TRIANGLE INSTITUTE (RTI) INTERNATIONAL
Social Policy, Health & Economics Research (*SPHERE*)

Main Office Address:
3040 Cornwallis Road
PO Box 12194
Research Triangle Park, NC 27709

Phone: (919) 541-6000
Fax: (919) 541-5985

Waltham MA Office:
1440 Main Street, Suite 310
Waltham, MA 02451

Phone: (781) 434-1700
Fax: (781) 434-1701

Website:
www.rti.org

RTI International is an independent, nonprofit research institute based in Research Triangle Park, North Carolina. Established in 1958 as the Research Triangle Institute, RTI has a distinguished history of scientific achievement in the areas of health and pharmaceuticals, education and training, surveys and statistics, advanced technology, international development, economic and social policy, energy and the environment, and laboratory testing and chemical analysis. RTI's staff of more than 5,500 supports projects in more than 75 countries.

The organization was founded by a joint action of the University of North Carolina at Chapel Hill, Duke University, and North Carolina State University as the first scientific organization in the Research Triangle Park (RTP), North Carolina. RTI today comprises four research units, of which the largest encompasses statistics, health and social policy and survey research.

RTI staff have extraordinary depth of expertise in collecting, assessing, and reporting policy-oriented information and conducting health services research in many areas, including payment system design, risk adjustment, cost estimation and cost-effectiveness analysis, as well as state health care reform and Medicaid program evaluation. In addition, RTI possesses substantial capabilities in the analysis of large databases. Staff members are highly regarded in their respective areas of expertise and they have testified before the U.S. Congress, MedPAC (and its predecessor agencies ProPAC and PPRC), and various state commissions.

RTI's main campus is located on 180 acres in North Carolina's RTP. In addition, RTI maintains well-staffed research facilities at sites in Washington, DC; Rockville, Maryland; Waltham, Massachusetts; Chicago, Illinois; Atlanta, Georgia; and at numerous project locations in the United States and abroad.

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