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Final Recommendation for the Maryland Hospital Acquired Conditions Program for Rate Year 2023

November 12, 2020

This document contains the final staff recommendations for the Maryland Hospital Acquired Conditions Program for RY 2023 approved by he Commission.

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List of Abbreviations

AHRQ	Agency for Health Care Research and Quality
APR-DRG	All Patients Refined Diagnosis Related Groups
CMS	Centers for Medicare & Medicaid Services
CY	Calendar Year
DRG	Diagnosis-Related Group
FFY	Federal Fiscal Year
FY	State Fiscal Year
HAC	Hospital-Acquired Condition
HAI	Hospital Associated Infection
HSCRC	Health Services Cost Review Commission
ICD	International Statistical Classification of Diseases and Related Health Problems
MHAC	Maryland Hospital-Acquired Condition
NHSN	National Healthcare Safety Network
NQF	National Quality Forum
PMWG	Performance Measurement Work Group
POA	Present on Admission
PPC	Potentially Preventable Complication
PSI	Patient Safety Indicator
QBR	Quality-Based Reimbursement
RY	Rate Year
SIR	Standardized Infection Ratio
SOI	Severity of Illness
TCOC	Total Cost of Care
VBP	Value-Based Purchasing
YTD	Year to Date

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Key Methodology Concepts and Definitions

Potentially preventable complications (PPCs): 3M originally developed 65 PPC measures, which are defined as harmful events that develop after the patient is admitted to the hospital and may result from processes of care and treatment rather than from the natural progression of the underlying illness. PPCs, like national claims-based hospital-acquired condition measures, rely on **present-on-admission codes** to identify these post-admission complications.

At-risk discharge: Discharge that is eligible for a PPC based on the measure specifications

Diagnosis-Related Group (DRG): A system to classify hospital cases into categories that are similar clinically and in expected resource use. DRGs are based on a patient's primary diagnosis and the presence of other conditions.

All Patients Refined Diagnosis Related Groups (APR-DRG): Specific type of DRG assigned using 3M software that groups all diagnosis and procedure codes into one of 328 All-Patient Refined-Diagnosis Related Groups.

Severity of Illness (SOI): 4-level classification of minor, moderate, major, and extreme that can be used with APR-DRGs to assess the acuity of a discharge.

APR-DRG SOI: Combination of Diagnosis Related Groups with Severity of Illness levels, such that each admission can be classified into an APR-DRG SOI "cell" along with other admissions that have the same Diagnosis Related Group and Severity of Illness level.

Case-Mix Adjustment: Statewide rate for each PPC (i.e., normative value or "norm") is calculated for each diagnosis and severity level. These **statewide norms** are applied to each hospital's case-mix to determine the expected number of PPCs, a process known as **indirect standardization**.

Observed/Expected Ratio: PPC rates are calculated by dividing the observed number of PPCs by the expected number of PPCs. Expected PPCs are determined through case-mix adjustment.

Diagnostic Group-PPC Pairings: Complications are measured at the diagnosis and Severity of Illness level, of which there are approximately 1,200 combinations before one accounts for clinical logic and PPC variation.

Zero norms: Instances where no PPCs are expected because none were observed in the base period at the Diagnosis Related Group and Severity of Illness level.

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Policy Overview

Policy Objective	Policy Solution	Effect on Hospitals	Effect on Payers/Consumers	Effects on Health Equity
The quality programs operated by the Health Services Cost Review Commission, including the Maryland Hospital Acquired Conditions (MHAC) program, are intended to ensure that any incentives to constrain hospital expenditures under the Total Cost of Care Model do not result in declining quality of care. Thus, HSCRC's quality programs reward quality improvements and achievements that reinforce the incentives of the Total Cost of Care Model, while guarding against unintended consequences and penalizing poor performance.	The MHAC program is one of several pay-for-performance quality initiatives that provide incentives for hospitals to improve and maintain high-quality patient care and value over time.	The MHAC policy currently holds 2 percent of hospital revenue at-risk for complications that may occur during a hospital stay as a result of treatment rather than the underlying progression of disease. Examples of the types of hospital acquired conditions included in the current payment program are respiratory failure, pulmonary embolisms, and surgical-site infections.	This policy affects a hospital's overall GBR and so affects the rates paid by payers at that particular hospital. The HSCRC quality programs are all-payer in nature and so improve quality for all patients that receive care at the hospital.	Historically the MHAC policy included the better of improvement and attainment, which incentivized hospitals to improve poor clinical outcomes that are often emblematic of disparities. The protection of improvement has since been phased out to ensure that poor clinical outcomes and the associated health disparities are not made permanent, which is especially important for a measure that is limited to in-hospital complications. In the future, the MHAC policy may provide direct hospital incentives for reducing disparities, similar to the approved readmission disparity gap improvement policy.

Recommendations

The MHAC policy was redesigned in Rate Year (RY) 2021 to modernize the program for the new Total Cost of Care Model. This RY 2023 final recommendation, in general, maintains the measures and methodology that were developed and approved for RY 2022.[1]

These are the final recommendations for the RY 2023 Hospital-Acquired Conditions (MHAC) policy:

1. Continue to use 3M Potentially Preventable Complications (PPCs) to assess hospital acquired complications.
    a. Maintain a focused list of PPCs in the payment program that are clinically recommended and that generally have higher statewide rates and variation across hospitals.
    b. Monitor all PPCs and provide reports for hospitals and other stakeholders.
        i. Evaluate PPCs in "Monitoring" status that worsen and consider inclusion back into the MHAC program for RY 2024 or future policies.
2. Use more than one year of performance data for small hospitals (i.e., less than 20,000 at-risk discharges and/or 20 expected PPCs). The performance period for small hospitals will be CY 2021 plus the to be determined performance period for RY 2022 (i.e., January-June 2020 data will not be used).
3. Continue to assess hospital performance on attainment only.
4. Continue to weigh the PPCs in the payment program by 3M cost weights as a proxy for patient harm.
5. Maintain a prospective revenue adjustment scale with a maximum penalty at 2 percent and maximum reward at 2 percent and continuous linear scaling with a hold harmless zone between 60 and 70 percent.
6. Adjust the MHAC pay-for-performance program methodology as needed due to COVID-19 Public Health Emergency and report to Commissioners as follows:
    a. For RY 2022 (CY 2020 performance period)
        i. Exclude COVID-19 positive cases from the program.
        ii. Exclude the data for January to June 2020 and evaluate the reliability and validity of the data for July-December 2020 to determine feasibility of its use and any

[1] See the RY 2022 policy for detailed discussion of the MHAC redesign, rationale for decisions, and approved recommendations

needed changes for the RY 2022 payment adjustments.

iii. Evaluate case-mix adjustment and performance standards concerns arising from use of a pre-COVID time period to determine normative values.

b. For RY 2023 (CY 2021 performance period)

i. Update PPC Grouper to v38 and include COVID-19 positive cases consistent with the clinical updates to the grouper.

ii. Retrospectively evaluate case-mix adjustment and performance standards concerns arising from inclusion of COVID-19 patients and the use of a pre-COVID time period to determine normative values.

Introduction

Since 2014, Maryland hospitals have been funded under a Population-Based Revenue system, a fixed annual revenue cap that is adjusted for inflation, quality performance, reductions in potentially avoidable utilization, market shifts, and demographic growth. Under the Population-Based Revenue system, hospitals are incentivized to transition services to the most appropriate setting of care, and may keep savings that they achieve via improved health care delivery (e.g., reduced avoidable utilization, readmissions, hospital-acquired infections). It is important that the Commission ensure that any incentives to constrain hospital expenditures do not result in declining quality of care. Thus, the Maryland Health Services Cost Review Commission's (HSCRC's or Commission's) quality programs reward quality improvements and achievements that reinforce the incentives of the Population-Based Revenue system, while guarding against unintended consequences and penalizing poor performance.

The Maryland Hospital Acquired Conditions (MHAC) program is one of several pay-for-performance initiatives that provide incentives for hospitals to improve and maintain high-quality patient care and value over time. The MHAC policy currently holds 2 percent of hospital revenue at-risk for complications that may occur during a hospital stay as a result of treatment rather than the underlying progression of disease. Examples of the types of hospital acquired conditions included in the current payment program are respiratory failure, pulmonary embolisms, and surgical-site infections.

With the commencement of the Total Cost of Care (TCOC) Model Agreement with CMS on January 1, 2019, the performance standards and targets in HSCRC's portfolio of quality and value-based payment programs are being reviewed and updated. This is in response to stakeholder requests that these policies be reviewed to ensure they remain in line with the goals of the Model and that they maintain methodological validity. Additionally, because the State must also request annual exemptions from the CMS Hospital Acquired Conditions (HAC) program as well as the other quality programs in the State, another key aspect of these reviews is to demonstrate that Maryland's program results continue to be aggressive and progressive, i.e., meeting or surpassing those of the nation. In CY 2018, staff focused on the MHAC program redesign and convened a Clinical Adverse Events Measure (CAEM) subgroup with clinical and measurement expertise who made recommendations that were then further evaluated by the Performance Measurement Workgroup (PMWG) and approved by the Commission.

The major accomplishments of the MHAC program redesign were focusing the payment incentives on a narrower list of clinically significant complications, moving to an attainment only system given Maryland's sustained improvement on complications, adjusting the scoring methodology to better differentiate hospital performance, and weighting complications by their associated cost weights as a proxy for patient harm. The redesign also assessed how hospital performance is converted to revenue adjustments, and ultimately

recommended maintaining the use of a linear prospective revenue adjustment scale with a hold harmless zone.

Due to the recent MHAC program redesign and the ongoing COVID-19 Public Health Emergency (PHE), this RY 2023 final MHAC policy does not propose major changes to the program. Furthermore, the assessment section focuses on 2019 data because CMS has suspended use of claims-based data from January to June 2020. The RY 2022 policy will therefore need to be amended to reflect the exclusion of six months of the planned performance period.[2] However, as we are still under the COVID-19 PHE, and just recently able to review July 2020 and onward data, it is too early for staff to propose comprehensive changes to the RY 2022 quality policies. COVID-19 positive patients are more likely to experience a respiratory PPC, and 3M will exclude these PPCs for COVID patients from their grouper logic in the newly released PPC Grouper version 38. Staff has worked with 3M and proposes to exclude COVID-19 positive patients from the RY 2022 pay-for-performance program, which uses PPC grouper version 37 that assigns respiratory PPCs to COVID positive patients. The HSCRC staff anticipates bringing amended RY 2022 policies to the Commission in February 2021 at the earliest, upon review of the data from the second half of CY 2020. While the PHE is ongoing, the HSCRC remains committed to ensuring that inpatient quality for all patients seeking care remains high. Analysis of June and July 2020 inpatient volumes suggests that the inpatient volume has mostly returned to pre-COVID levels, and so we will propose a RY 2023 MHAC policy here, with the understanding that we will revisit this policy if the PHE trends change.

Background

Exemption from Federal Hospital-Acquired Condition Programs

The Federal Government operates two hospital complications payment programs, the Deficit Reduction Act Hospital Acquired Condition program (DRA-HAC), which reduces reimbursement for hospitalizations with inpatient complications, and the HAC Reduction Program (HACRP), which penalizes hospitals with high rates of complications. Detailed information, including HACRP complication measures, may be found in Appendix I.

Because of the State's unique all-payer hospital model and its population based revenue system, Maryland does not directly participate in the federal pay-for-performance programs. Instead, the State administers the Maryland Hospital Acquired Conditions (MHAC) program, which relies on quality indicators validated for use with an all-payer inpatient population. However, the State must submit an annual report to CMS demonstrating that Maryland's MHAC program targets and results continue to be aggressive and

[2] CMS Announces Relief for Clinicians, Providers, Hospitals and Facilities Participating in the Quality Reporting Programs in Response to COVID-19

progressive, i.e. that Maryland's performance meets or surpasses that of the nation. Specifically, the State must ensure that the improvement in complication rates observed under the All-Payer Model is maintained. CMS granted Maryland exemption from the federal pay-for-performance programs (including the HAC Reduction Program) for Federal Fiscal Year 2021 on September 29, 2020.

Overview of the MHAC Policy

The MHAC program, which was first implemented for RY 2011, is based on a system developed by 3M Health Information Systems (3M) to identify potentially preventable complications (PPCs) using present-on-admission codes available in claims data. 3M originally developed specifications for 65 PPCs[3], which are defined as harmful events that develop after the patient is admitted to the hospital and may result from processes of care and treatment rather than from the natural progression of the underlying illness. For example, the program holds hospitals accountable for pulmonary embolisms and surgical-site infections that occur during inpatient stays. These complications can lead to 1) poor patient outcomes, including longer hospital stays, permanent harm, and death; and 2) increased costs. Thus, the MHAC program is designed to provide incentives to improve patient care by adjusting hospital budgets based on PPC performance.

MHAC Redesign

With the exception of maintaining the linear scaling with a hold harmless zone to determine hospital rewards and penalties, the MHAC policy was substantially overhauled for RY 2021. The policy updates included:

- Selecting a narrowed list of 14 PPC complication measures to focus on the most clinically meaningful and significant measures for use in the payment program.
- Using two years of data for establishing normative values to address case-mix concerns.
- Assessing hospital performance on attainment-only, rather than continuing to credit improvement.
- Modifying the scoring methodology to better differentiate hospital performance.
- Weighting complications using 3M cost weights as proxies for patient harm.

The approved RY 2022 policy maintained the above changes and was updated to include use of two years of performance data for small hospitals (i.e., less than 20,000 at-risk discharges and/or 20 expected PPCs).

[3] In RY 2020, there were 45 PPCs or PPC combinations included in the program, from an initial 65 PPCs in the software, as 3M had discontinued some PPCs and others were deemed not suitable for a pay-for-performance program.

MHAC Methodology

Figure 1 provides an overview of the three steps in the RY 2022 MHAC methodology[4] that converts hospital performance to standardized scores, and then payment adjustments, as outlined below:

Step 1. For the PPCs identified for payment, global and hospital-level exclusions are determined.

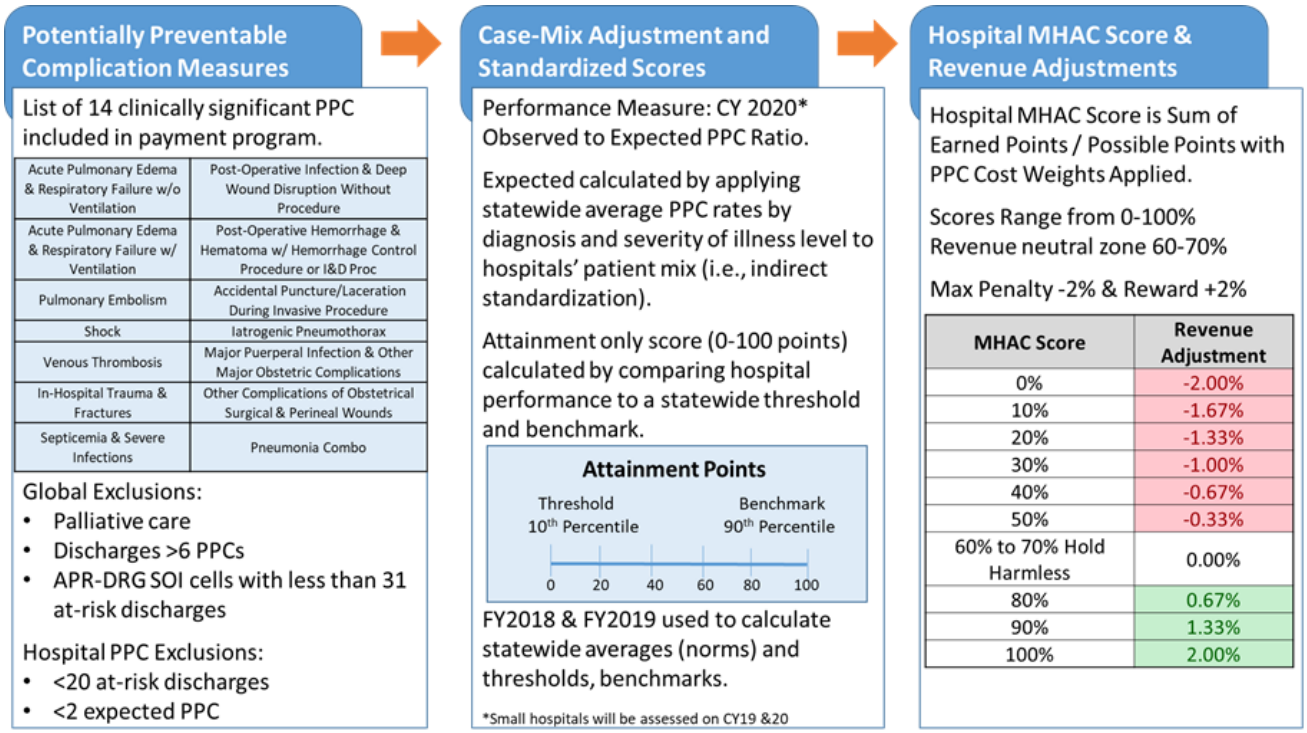
Step 2. Case-mix adjustment is used to calculate observed to expected ratios that are then converted to a standardized point based score (0-100 points) based on each hospital's attainment levels using the same scoring methodology that is used for CMS Value-Based Purchasing and Maryland QBR program.

Step 3. Overall hospital scores are then calculated by taking the points for each PPC and multiplying by the 3M PPC cost weights, then summing numerator (points scored) and denominator (possible points) across the PPCs to calculate a percent score. A linear point scale set prospectively is then used to calculate the revenue adjustment percent. This prospective scaling approach differs from national programs that relatively rank hospitals after the performance period.

Additional information on the current MHAC policy for RY 2022 can be found in Appendix II.

[4] Due to COVID-19 PHE, this methodology will need to be retrospectively adjusted, pending future CMS guidance, and to address any future surge in COVID cases.

Figure 1. Overview Rate Year 2022 MHAC Methodology



Assessment

In order to develop the RY 2023 MHAC policy, staff solicited input from the PMWG and other stakeholders. In general, stakeholders support the staff's recommendation to not make major changes to the RY 2023 MHAC program. This section of the report provides an overview of the data and issues discussed by the PMWG, including analysis of statewide PPC trends, estimated hospital scores, and revenue adjustment modelling.

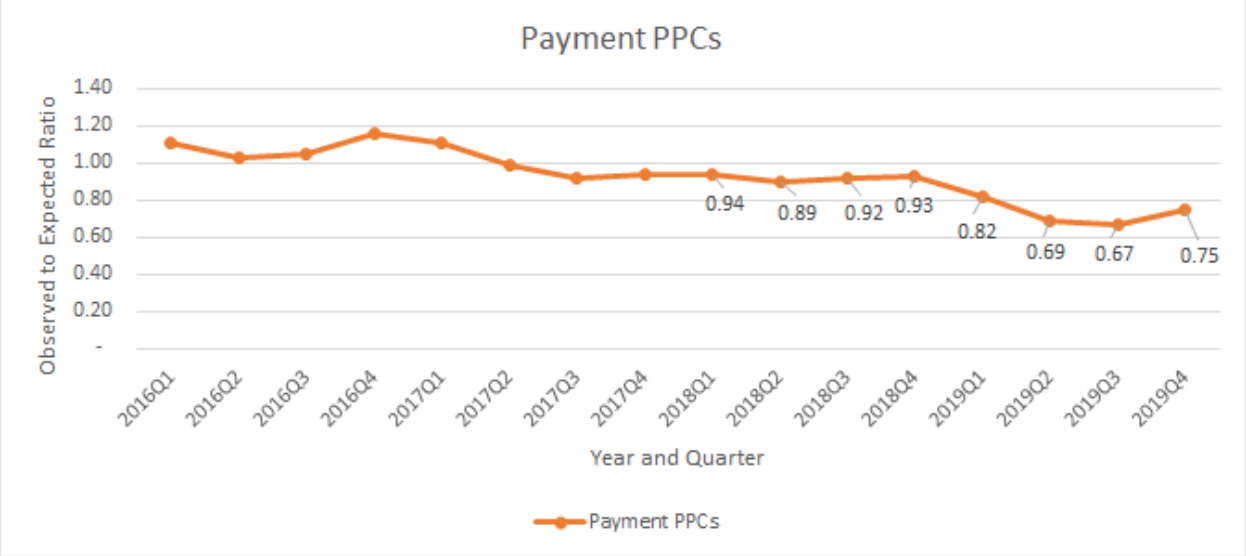
Statewide PPC Performance Trends

Complications Included in Payment Program

Under the All-Payer Model, Maryland hospitals saw a dramatic decline in complications and, as a State, well exceeded the requirement of a 30 percent reduction by the end of CY 2018. These reductions were achieved through clinical quality improvement, as well as improvements in documentation and coding. As mentioned previously, the MHAC redesign assessed which PPCs should be included in the pay-for-performance program based on criteria developed by the CAEM subgroup. The criteria included clinical significance, opportunity for improvement, sample size considerations, and variation across hospitals.

Under the TCOC Model, Maryland must maintain these improvements by not exceeding the CY 2018 PPC rates. Figure 2 below shows the statewide observed to expected (O/E) ratio from 2016 through CY 2019.[5] The O/E ratio presents the count of observed PPCs divided by the calculated number of expected PPCs (which is generated using normative values applied to the case-mix of discharges a hospital experiences). An O/E Ratio of greater than 1 indicates that a hospital experienced more PPCs than expected, and conversely, an O/E Ratio less than one indicates that a hospital experienced fewer PPCs than expected. The figure below also indicates how Maryland is performing relative to CY 2018, which is the time period that will be used to assess any backsliding on performance. Specifically, the CY 2019 performance data for payment program PPCs show that there has been about a 20 percent reduction in the observed to expected ratio (CY 2018 O/E ratio = 0.92 and CY 2019 O/E ratio = 0.73).

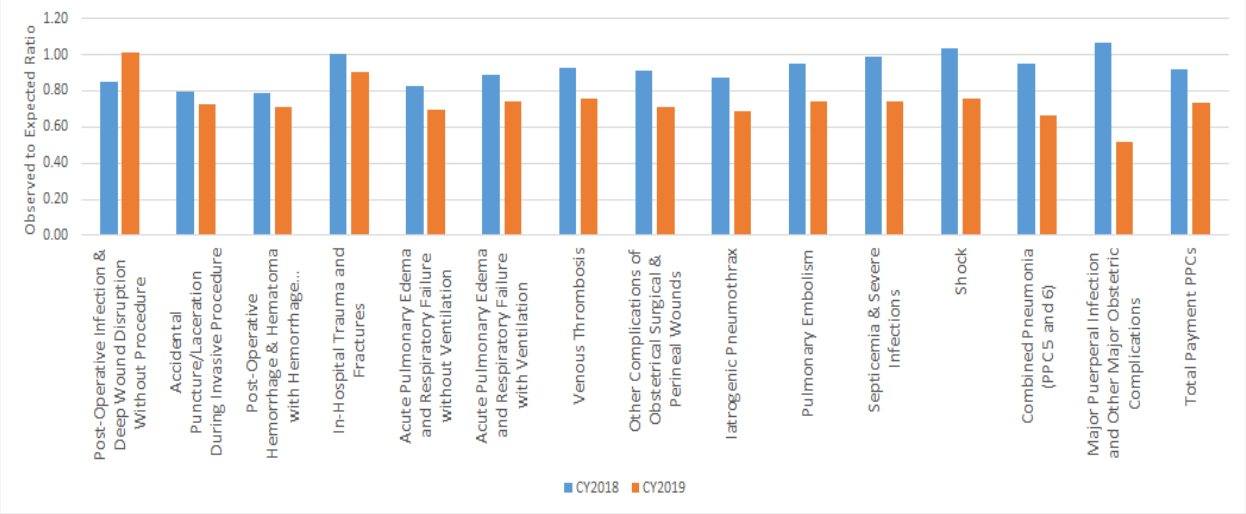
Figure 2. Payment Program PPCs Observed to Expected Ratios CY 2016 to CY 2019



In terms of specific improvements among the 14 payment PPCs, Figure 3 shows the O/E ratios for CY 2018 and CY 2019, sorted from greatest percent increase (on the left) to greatest decrease (on the right). The one PPC that experienced a worse (increased) O/E was PPC 37 - Post-Operative Infection and Deep Wound Disruption without Procedure. The three PPCs with the greatest decreases include PPC 60 - Major Puerperal Infection and Other Major Obstetric Complications, PPC 9 - Shock, and the combined Pneumonia PPC.

[5] Staff notes that, consistent with federal policies during the COVID Public Health Emergency, PPC data from January-June 2020 will not be used.

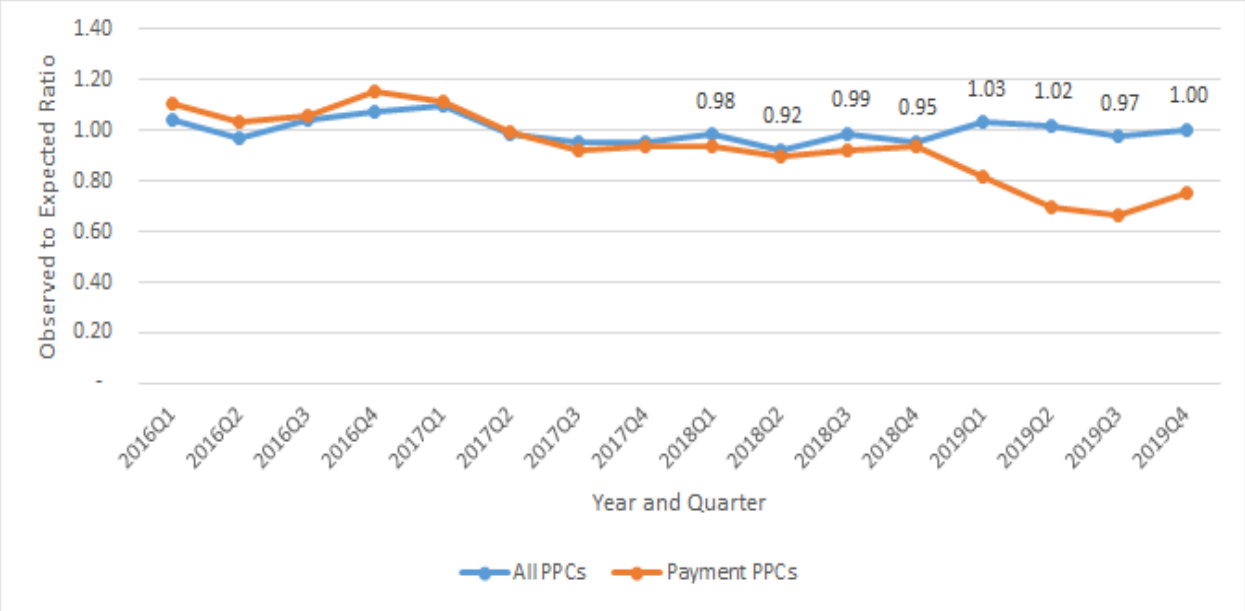
Figure 3. Payment Program PPC Observed to Expected Ratios CY 2018 and CY 2019



Monitored Complications

In addition to focusing on a narrowed list of PPCs for payment, the RY 2021 MHAC Policy included a recommendation to monitor the remaining PPCs. Staff fulfills this recommendation by monitoring all PPCs that are still considered clinically valid by 3M, and distinguishing between “Monitoring” and “Payment” PPCs, as in the analysis below. The overall PPC trend across all 54 PPCs shows that there has been a slight increase in the overall statewide O/E ratio from 0.96 in CY 2018 to 1.01 in CY 2019; the slight worsening in performance is driven primarily by increases in PPCs under monitoring status, and not increases in the payment program PPCs, as illustrated in Figure 4. As discussed in the RY 2022 policy, staff had reached out to hospitals with increases in monitoring PPCs and had been given several reasons for the increase unrelated to declining quality. Furthermore, staff had planned to analyze CY 2019 and 2020 data through June to determine whether any monitored PPCs needed to be placed back into the payment program. Due to the lack of valid and reliable data during the COVID-19 PHE, staff is not recommending any PPCs be moved back into the payment program for RY 2023, but will maintain the recommendation to monitor and possibly move PPCs back into the payment program in the future. Appendix III provides the statewide changes in observed, expected, and the O/E ratio for the monitoring PPCs sorted by the observed PPCs that accounted for the largest proportion of the increase from 2018 to 2019.

Figure 4. PPC O/E Ratio Trends CY 2016 Through CY 2019



COVID-19 Program Adjustments

Staff notes that, on September 2, 2020, CMS published an Interim Final Rule (IFR) in response to the COVID-19 PHE. In this IFR, they announced that:

- CMS will not use CY Q1 or CY Q2 of 2020 quality data even if submitted by hospitals.
- CMS is still reserving the right to suspend application of revenue adjustments for FFY 2022 for all hospital pay for performance programs at a future date in 2021; changes will be communicated through memos ahead of IPPS rules.

It is not known at this time if Maryland has flexibility in suspending our programs, and furthermore, Maryland's decision must be made prior to CMS making their decision due to the prospective nature of our pay-for-performance programs. However, CMMI has strongly suggested that the State must have quality program adjustments, and has further suggested that the State pursue alternative strategies, such as reusing portions of CY 2019 (as is being done for the Skilled Nursing Facility VBP program) to create a 12-month performance period, should that be necessary for data reliability and validity.

In context of the CMS announcement and CMMI comments, staff has evaluated the data issues and options for the RY 2022 MHAC program in Maryland, as illustrated in Figure 5 below.

Figure 5. RY 2022 COVID-Related Data Concerns and Options

COVID Data Concerns	Options
Only 6 months of data for CY 2020: 1. Is 6-months data reliable? 2. What about seasonality?	• Use 6-months data, adjust base as needed for seasonality concerns • Merge 2019 and 2020 data together to create a 12 month performance period • Use 2019 data or revenue adjustments
Clinical concerns over inclusion of COVID patients (e.g., assignment of respiratory failure as an in-hospital complication)	• Remove COVID patients from CY 2020 PPC evaluation
Case-mix adjustment, performance standard and revenue adjustment scale concerns: 1. Inclusion of COVID patients when not in normative values 2. Impacts on other DRG/SOI of COVID PHE	• Remove COVID patients from CY 2020 PPC evaluation • Develop concurrent norms and performance standards for comparison and possible use • Use 2019 data or revenue adjustments • Modify revenue adjustment scale to recognize COVID related concerns

At this stage, staff believes the most appropriate approach for the MHAC program is to exclude the COVID-19 patients[6] if any CY 2020 data is used. Under v37.1 of the PPC grouper, some respiratory PPCs such as respiratory failure, or other COVID sequelae such as septicemia, may be assigned to COVID-19 positive patients. Over the coming months, staff will work to assess any case-mix adjustment and performance standard issues due to the absence of COVID-19 patients in the base period and normative values, and to finalize the performance period. Staff will provide updates to the Commission in February, at the earliest, on the final decisions for any adjustments to all RY 2022 quality policies.

For RY 2023, the program will use v38 of the PPC grouper, which is updated with additional clinical exclusions for COVID-19 positive patients. For example, none of the respiratory failure or the septicemia PPC will be assigned to COVID-positive patients under this updated version. Staff will need to consider any additional modifications to address case-mix adjustment and performance standard concerns that may arise from inclusion of COVID-19 positive patients in the performance period, especially since COVID-19 cases were not part of the statewide normative values. Furthermore, based on stakeholder comments, analyses should be done on case-mix adjustment and performance standards concerns for non-COVID patients. Last, as discussed below, staff will need to determine the extended performance period for small hospitals.

[6] COVID-19 cases are defined as those coded with the ICD10 code U07.1

Small Hospital Methodology

Hospital-specific PPC inclusion requirements were maintained in the RY 2022 policy, i.e., all hospitals are required to have at least 20 at-risk discharges and 2 expected PPCs in order for a particular PPC to be included in the payment program. Because of the volatility in performance scores for smaller hospitals, the Commission also approved the following policy updates in RY 2022:

Establish small hospital criteria for assessing performance under the MHAC policy based on the number of at-risk discharges and expected PPCs (i.e., small hospitals are those with less than 20,000 at-risk discharges and/or 20 expected PPCs across all payment program PPCs) as opposed to the number of PPC measure types, and for hospitals that meet small hospital criteria, increase reliability of score by using two years of performance data to assess hospital performance (i.e., for RY 2022 use CY 2019 and 2020).

For RY 2023, staff proposes to maintain the small hospital criteria and expected to utilize CY 2020 and CY2021 for the assessment of small hospitals. However, staff will need to reconsider this approach due to the COVID related suspension of data use for January to June of 2020. This same concern arises for calculating RY 2022 revenue adjustment. Thus, in the recommendations, staff are proposing that for small hospitals more than one year of data be used, and that the performance period will be CY 2021 plus yet to be determined performance period for RY 2022. For example, if the Commission decides to use July to December 2020 for RY 2022, then small hospitals for RY 2023 will be assessed on data from July 2020 through December 2020 and January to December 2021.

Hospital Scores and Revenue Adjustments

Given the lack of CY 2020 data and few proposed changes to the RY 2023 MHAC methodology, prospective modeling of hospital scores and revenue adjustments are not being included in this final policy. However, for reference, staff are providing a summary of the RY 2021 hospital scores and revenue adjustments.

RY 2021 MHAC Scores

For the RY 2021 policy, the policy evolved to an attainment-only system with wider performance standards (i.e., 10th and 90th percentiles) to better differentiate hospital performance. Figure 6 provides descriptive statistics for the total hospital scores. For RY 2023, no changes are being proposed for how scores are calculated for each PPC or the total hospital score. The performance standards (i.e., normative values, benchmark, threshold) will be calculated using CY 2018 and CY 2019 (normally they would be updated through FY 2020 but that would include the suppressed January to June performance period) under version

38. The performance period will be CY 2021, except as discussed for small hospitals where a longer time period will be used.

Figure 6. RY 2021 Hospital Scores

RY 2021 Hospital Scores	CY 2019 Performance
Median	73%
Average	74%
Min	46%
Max	100%
25th Percentile	64%
75th Percentile	86%

Revenue Adjustment Scale Modeling

Staff proposes to maintain the RY 2021 and RY 2022 preset scale for RY 2023. This scale ranges from 0 to 100 percent, with a hold harmless zone between 60 and 70 percent. Despite historical concerns regarding the lack of a continuous scale from some stakeholders, staff still believe that the hold harmless zone is reasonable given the lack of national benchmarks for establishing a cut-point. While staff have concerns that the cut point for rewards may need to be raised due to the high median score, staff are not proposing any changes to the revenue adjustment scale because of the COVID PHE but will reassess this in future years. Figure 7 provides the count of hospitals in the penalty, hold harmless, and reward zones in RY 2021, alongside the statewide net revenue adjustments. Appendix IV contains the by hospital scores and revenue adjustments. These scores and revenue adjustments do not include the RY 2022 change to use two years of data for small hospitals since this change will have a minimal impact on statewide adjustments. Statewide penalties totaled $3.3 million in RY2021, while Statewide rewards totaled $41.9 million.

Figure 7: RY 2021 Revenue Adjustments

RY 2021 Statewide Revenue Adjustments	$	%
Net	$38,638,052	0.38%
Penalties	-$3,257,770	-0.03%
Rewards	$41,895,822	0.41%
# Hospitals Penalized	10	
# Hospitals Revenue Neutral	8	
# Hospitals Rewarded	27	

Additional Future Considerations

For future years it will be important to continue to seek national comparison data to evaluate relative Maryland PPC performance. The AHRQ HCUP data, containing all-payer claims data from ~40 states, may provide such an opportunity, however, staff notes that the data lag is two years. Staff also intends to include the newly available all-payer Patient Safety Indicator (PSI) composite, the PSI-90 measure, in the RY 2023 QBR program. This PSI measure includes some complications that are similar to payment program PPCs in the MHAC program, and allows Maryland to compare its performance to that of the nation (e.g., respiratory failure). The PSI-90 composite also includes some safety indicators similar to monitoring-only PPCs, such as pressure ulcers, enabling Maryland to compare its performance to that of the nation on non-payment hospital complications.

Additionally, staff will monitor other safety measures in use or under consideration nationally for reporting or payment; these measures will be considered for possible inclusion in the MHAC program for FY 2024 or beyond. Staff further believes that the upcoming work group to modernize the QBR program in 2021 will also provide an opportunity to reevaluate complication measures and the respective roles of the QBR safety domain and MHAC program.

Finally, staff notes that patient race and ethnicity, social determinants of health, socioeconomic status, and neighborhood factors may be relevant to consider, as hospitals and the State of Maryland work to address disparities in health outcomes. Staff will plan to analyze the complication measures data to understand and target disparities in future years.

Stakeholder Feedback and Staff Responses

Comment letters on the draft MHAC recommendations were submitted by the Maryland Hospital Association (MHA), the Johns Hopkins Health System (JHHS), and University of Maryland Medical System (UMMS). All three commenters generally support the RY 2023 MHAC policy and continued use of the revised MHAC methodology.

However, some targeted concerns were raised and suggestions provided for modifying specific aspects of the draft recommendations. These comments and suggestions are summarized below along with staff's responses.

Revenue Adjustment Scale Cut Points

Both the UMMS and the MHA letter caution against changing the revenue adjustment scale for RY 2023, and UMMS raises concerns about the RY 2022 revenue adjustment scale due to COVID and changes to

severity of illness levels under version 37 of the 3M PPC grouper. JHHS also raised concerns that the revenue adjustment scale for RY 2022 may need to be adjusted to account for actual statewide data from July through December 2020 that may yield atypical performance assessments.

Staff Response: Staff are supportive of not raising the cut point for rewards for the RY 2023 MHAC policy due to COVID concerns. In terms of the concerns raised by UMMS regarding the differences between v36 and v37 of the PPC grouper, staff notes that the final RY 2022 MHAC policy did model scores and revenue adjustments using v37 of the grouper. As such, staff are not convinced that the SOI changes due to the grouper version need to be addressed. However, as the RY 2022 policy is to be updated due to COVID-19 PHE, staff recognize that the revenue adjustment scale may need to be modified.

COVID-19 PHE Concerns

UMMS and JHHS both raise concerns regarding COVID-19 for RY 2022 and RY 2023. Specifically, UMMS raises the concerns that specific PPCs (e.g., sepsis) appear to be increasing in non-COVID patients and that this trend is being seen nationally with several studies positing that resource diversion may impact expected outcomes. JHHS meanwhile requests that COVID-19 positive patients be excluded from the RY 2023 policy pending hospitals being able to assess the grouper changes.

Staff Response: Staff concur that there are several COVID-19 related concerns that will need to be evaluated for RY 2022 and RY 2023, and have tried to outline these concerns in this policy based on this and other input. At this time, staff still support the inclusion of COVID-19 patients in the RY 2023 policy due to the clinical changes 3M has made to the grouper. These changes remove COVID-19 positive patients from eight out of fourteen of the PPCs, and staff believe that hospitals should be accountable for the remaining PPCs occurring in COVID-19 positive patients (e.g., in-hospital trauma or fracture or accidental puncture/laceration during invasive procedure). However, as with RY 2022, retrospective changes due to COVID-19 will need to be evaluated at a later date and if at that time it is deemed that the clinical changes to the v38 of the PPC grouper were inadequate, the Commission can remove COVID-19 patients at that time.

Financial Impact of Observed PPCs

JHHS raises concerns that where the at-risk volume is small that the assignment of a single PPC can have an excessive financial impact. They specifically cite that the cost of one PPC can be over $1 million and recommend that we review the actual cost per PPC by facility. In addition, they raise the concern that the number of PPCs were reduced as part of the MHAC Redesign but that revenue at-risk has remained the same.

Staff Response: Staff have modeled RY 2021 data for JHHS adding and subtracting a single PPC individually for each measure. For the majority of the PPCs (11 out of 14), there was no change in the MHAC score with a one PPC increase or decrease. However for three low volume PPCs, a one PPC increase did lower the total MHAC score by 1 percentage point, which in the case of Hopkins equals around a $1 million dollar change in rewards in the revenue adjustment scale (if in the penalty zone, the revenue change would be less given the scale is not symmetrical and there are more gradations in scoring for poor performance.

It is important to note though this outcome of 1 fewer PPC at JHHS equaling an additional $1 million in rewards is more a function of JHHS' budgetary scale relative to the rest of the State. If a hospital with an average revenue base in the state (approximately $225 million) experienced a change of 1 PPC that results in a 1 percent score change in its performance assessment, its rewards would be reduced by approximately $150 thousand instead of $1 million, and the order of magnitude would be significantly less if the hospital was eligible for a penalty because of the asymmetry of the scale, as aforementioned.

Given rewards and penalties are expressed as a percent of inpatient revenue, it is not surprising the JHHS has much higher financial adjustments in terms of actual dollars. In fact, in the first year of the redesigned MHAC program, JHHS received just over $2 million in rewards, whereas a hospital with the same performance but an average revenue base of $225 million would only have received $300 thousand in rewards.

Finally, staff notes that there is limited latitude in reducing the revenue-at-risk in the MHAC program. All of the quality programs combined and their associated revenue-at-risk are needed to ensure the State meets its CMS aggregate at-risk requirements. Moreover, the allotment of revenue-at-risk is not a function of how many measures are assessed, e.g. readmissions, which constitutes one third of the required revenue-at-risk, is only one measure and MHAC, which similarly constitutes one third of the required revenue-at-risk, has 14 measures. Staff do note though in concert with the QBR redesign, the Commission will reevaluate revenue at-risk across all programs and could consider taking this concern regarding the reduced number of PPCs and the associated revenue-at-risk into account However, staff feel the more appropriate approach would be to use the allotment of revenue-at-risk to reflect Commissioner priorities, e.g., potentially increasing the weight of the QBR program and concurrently decreasing the weight of another quality program given the importance of improving in many of metrics that the State has historically fared poorly in (HCAHPS, NHSN).

Concerns over 3M PPC Logic and PPC Appeals

Consistent with their input over the last two year, JHHS raises concerns with the PPC logic and suggests that an appeals process be established for the MHAC program where HSCRC convenes clinicians to review individual PPC cases in dispute.

Staff Response: Staff continues to not support a process for individual PPC cases to be disputed by clinicians. Staff notes the MHAC program is rate-based (i.e., observed PPCs to expected PPCs) and acknowledges that not all PPCs are completely preventable. Staff further notes that we undertake with MHA, hospital clinicians and 3M an annual process to review the PPC clinical assignment and exclusion logic, which results in annual changes to the PPC clinical logic. Therefore, staff continues to assert that the current process for clinical vetting with the industry and 3M is adequate. Furthermore, staff notes that CMS does not have any clinical appeals processes for individual complications for the measures in their quality programs. Finally, staff notes again that we accept hospital feedback and input throughout the year regarding specific issues related to coding assignment and exclusion logic and work with 3M to resolve the issues as they occur.

Underestimated Expected Values

JHHS' comment letter continues to raise concerns on the mathematical methodology for calculating expected PPC counts. While not specifically stated in this letter, JHHS has stated previously that it believes that the current methodology of indirect standardization to calculate statewide normative values results in a hospital's expected values being underestimated. In previous letters, JHHS has specifically stated that they support implementation of a Bayesian adjustment that adjusts for or smooths small volume events, making them more statistically stable. UMMS also raised concerns about underestimated expected values, but this was around the conversion from Version 36 to Version 37 of the PPC grouper and not the mathematical approach of indirect standardization. The MHA letter did not specifically address this issue.

Staff Response: As stated in previous years, staff again notes that the zero norm issue has been minimized by narrowing down the list to the fourteen clinically significant PPCs, increasing the statewide at risk number from 2 to 31 for each diagnosis and severity of illness level, and using a two year period to establish the normative values. Staff would also note that in the RY 2021 policy, staff presented various analyses that supported the continued use of the indirect standardization methodology. Furthermore, other stakeholders have previously expressed support of this methodology because of its simplicity and transparency. Thus, for the RY 2023 policy, staff does not recommend any changes; however, staff will continue to monitor the small cell size issue in the MHAC program.

Recommendations

The MHAC policy was redesigned in Rate Year (RY) 2021 to modernize the program for the new Total Cost of Care Model. This RY 2023 final recommendation, in general, maintains the measures and methodology that were developed and approved for RY 2022.[7]

These are the final recommendations for the RY 2023 Hospital-Acquired Conditions (MHAC) policy:

1. Continue to use 3M Potentially Preventable Complications (PPCs) to assess hospital acquired complications.
    a. Maintain a focused list of PPCs in the payment program that are clinically recommended and that generally have higher statewide rates and variation across hospitals.
    b. Monitor all PPCs and provide reports for hospitals and other stakeholders.
        i. Evaluate PPCs in "Monitoring" status that worsen and consider inclusion back into the MHAC program for RY 2024 or future policies.
2. Use more than one year of performance data for small hospitals (i.e., less than 20,000 at-risk discharges and/or 20 expected PPCs). The performance period for small hospitals will be CY 2021 plus the to be determined performance period for RY 2022 (i.e., January-June 2020 data will not be used).
3. Continue to assess hospital performance on attainment only.
4. Continue to weigh the PPCs in the payment program by 3M cost weights as a proxy for patient harm.
5. Maintain a prospective revenue adjustment scale with a maximum penalty at 2 percent and maximum reward at 2 percent and continuous linear scaling with a hold harmless zone between 60 and 70 percent.
6. Adjust the MHAC pay-for-performance program methodology as needed due to COVID-19 Public Health Emergency and report to Commissioners as follows:
    a. For RY 2022 (CY 2020 performance period)
        i. Exclude COVID-19 positive cases from the program.
        ii. Exclude the data for January to June 2020 and evaluate the reliability and validity of the data for July-December 2020 to determine feasibility of its use and any

[7] See the RY 2022 policy for detailed discussion of the MHAC redesign, rationale for decisions, and approved recommendations

needed changes for the RY 2022 payment adjustments.

iii. Evaluate case-mix adjustment and performance standards concerns arising from use of a pre-COVID time period to determine normative values.

b. For RY 2023 (CY 2021 performance period)

i. Update PPC Grouper to v38 and include COVID-19 positive cases consistent with the clinical updates to the grouper.

ii. Retrospectively evaluate case-mix adjustment and performance standards concerns arising from inclusion of COVID-19 patients and the use of a pre-COVID time period to determine normative values.

Appendix I. Background on Federal Complication Programs

The Federal Government operates two hospital complications payment programs, the Deficit Reduction Act Hospital Acquired Condition program (DRA-HAC) and the HAC Reduction Program (HACRP), both of which are designed to penalize hospitals for post-admission complications.

Federal Deficit Reduction Act, the Hospital-Acquired Condition Present on Admission Program

Beginning in Federal Fiscal Year 2009 (FFY 2009), per the provisions of the Federal Deficit Reduction Act, the Hospital-Acquired Condition Present on Admission Program was implemented. Under the program, patients were no longer assigned to higher-paying Diagnosis Related Groups if certain conditions were acquired in the hospital and could have reasonably been prevented through the application of evidence-based guidelines.

Hospital-Acquired Condition Reduction Program

CMS expanded the use of hospital-acquired conditions in payment adjustments in FFY 2015 with a new program, entitled the Hospital-Acquired Condition Reduction Program, under the authority of the Affordable Care Act. That program focuses on a narrower list of complications and penalizes hospitals in the bottom quartile of performance. Of note, as detailed in Figure 1 below, all the measures in the Hospital-Acquired Condition Reduction Program are used in the CMS Value Based Purchasing program, and the National Healthcare Safety Network (NHSN) Healthcare-Associated Infection (HAI) measures are also used in the Maryland Quality Based Reimbursement (QBR) program.

Figure 1. CMS Hospital-Acquired Condition Reduction Program (HACRP) FFY 2020 Measures

Recalibrated Patient Safety Indicator (PSI) measure:^ ● PSI 03 – Pressure Ulcer Rate ● PSI 06 – Iatrogenic Pneumothorax Rate ● PSI 08 – In-Hospital Fall with Hip Fracture Rate ● PSI 09 – Perioperative Hemorrhage or Hematoma Rate ● PSI 10 – Postoperative Acute Kidney Injury Requiring Dialysis Rate ● PSI 11 – Postoperative Respiratory Failure Rate ● PSI 12 – Perioperative Pulmonary Embolism or Deep Vein Thrombosis Rate ● PSI 13 – Postoperative Sepsis Rate ● PSI 14 – Postoperative Wound Dehiscence Rate ● PSI 15 – Unrecognized Abdominopelvic Accidental Puncture/Laceration Rate
Central Line-Associated Bloodstream Infection (CLABSI)^*
Catheter-Associated Urinary Tract Infection (CAUTI)^*
Surgical Site Infection (SSI) – colon and hysterectomy^*
Methicillin-resistant Staphylococcus aureus (MRSA) Bacteremia^*
Clostridium Difficile Infection (CDI)^*

^Recalibrated PSI Composite Measures included in the CMS VBP Program beginning FFY 2023. * National Healthcare Safety Network (NHSN) Healthcare-Associated Infection (HAI) measures included in both the CMS VBP and Maryland QBR Programs.

For more information on the DRA HAC program POA Indicator, please refer to: https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/HospitalAcqCond/index

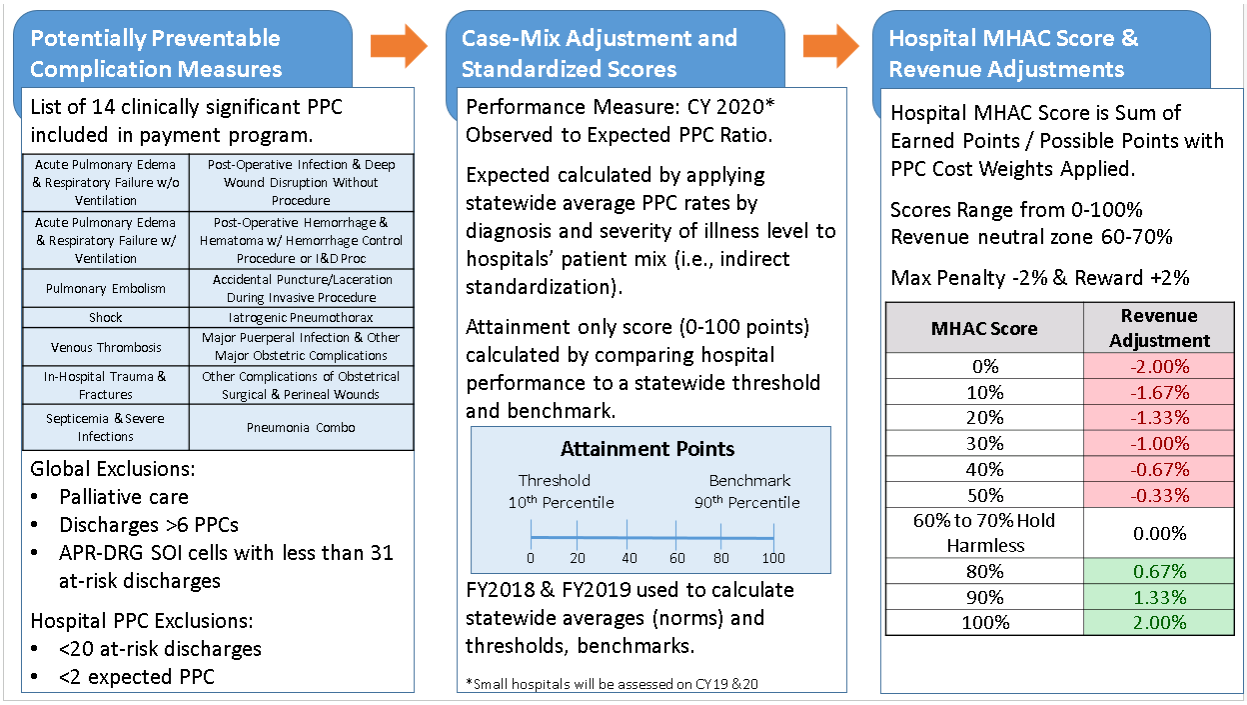
For more information on the DRA HAC program, please refer to: https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/HospitalAcqCond/Downloads/FAQ-DRA-HAC-PSI.pdf

For more information on the HAC Reduction program, please refer to: https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/AcuteInpatientPPS/HAC-Reduction-Program

Appendix II: RY 2022 MHAC Program Methodology

Figure 1 below provides a summary overview of the RY 2022 MHAC methodology.

Figure 1. Overview of RY 2022 MHAC Methodology



Performance Metric

The methodology for the MHAC program measures hospital performance using the Observed (O) /Expected (E) ratio for each PPC. Expected number of PPCs are calculated using historical data on statewide PPC rates by All Patient Refined Diagnosis Related Group and Severity of Illness Level (APR-DRG SOI). See below for details on how expected number of PPCs are calculated for each hospital.

Observed and Expected PPC Values

The MHAC scores are calculated using the ratio of $Observed : Expected$ PPC values.

Given a hospital's unique mix of patients, as defined by APR-DRG category and Severity of Illness (SOI) level, the HSCRC calculates the hospital's expected PPC value, which is the number of PPCs the hospital would have experienced if its PPC rate were identical to that experienced by a normative set of hospitals.

The expected number of PPCs is calculated using a technique called indirect standardization. For illustrative purposes, assume that every hospital discharge is considered "at-risk" for a PPC, meaning that all discharges would meet the criteria for inclusion in the MHAC program. All discharges will either have no

PPCs, or will have one or more PPCs. In this example, each discharge either has at least one PPC, or does not have a PPC. The unadjusted PPC rate is the percent of discharges that have at least one PPC.

The rates of PPCs in the normative database are calculated for each diagnosis (APR-DRG) category and severity level by dividing the observed number of PPCs by the total number of admissions. The PPC norm for a single diagnosis and severity level is calculated as follows:

Let:

N = norm

P = Number of discharges with one or more PPCs

D = Number of "at-risk" discharges

i = A diagnosis category and severity level

$$N_i = \frac{P_i}{D_i}$$

In the example, each normative value is presented as PPCs per discharge to facilitate the calculations in the example. Most reports will display this number as a rate per one thousand discharges.

Once the normative expected values have been calculated, they can be applied to each hospital. In this example, the normative expected values are computed for one diagnosis category and its four severity levels.

Consider the following example in Figure 2 for an individual diagnosis category.

Figure 2. Expected Value Computation Example for one Diagnosis Category

A Severity of illness Level	B At-risk Discharges	C Observed Discharges with PPCs	D PPCs per discharge (unadjusted PPC Rate)	E Normative PPCs per discharge	F Expected # of PPCs	G Observed: Expected Ratio
			= (C / B)	(Calculated from Normative Population)	= (B x E)	= (C / E) rounded to 4 decimal places
1	200	10	.05	.07	14.0	0.7143
2	150	15	.10	.10	15.0	1.0000
3	100	10	.10	.15	15.0	0.6667
4	50	10	.20	.25	12.5	0.8000
Total	**500**	**45**	**.09**		**56.5**	**0.7965**

For the diagnosis category, the number of discharges with PPCs is 45, which is the sum of discharges with PPCs (column C). The overall rate of PPCs per discharge in column D, 0.09, is calculated by dividing the total number of discharges with PPCs (sum of column C) by the total number of discharges at risk for PPCs (sum of column B), i.e., 0.09 = 45/500. From the normative population, the proportion of discharges with PPCs for each SOI level for that diagnosis category is displayed in column E. The expected number of PPCs for each severity level shown in column F is calculated by multiplying the number of at-risk discharges (column B) by the normative PPCs per discharge rate (column E). The total number of PPCs expected for this diagnosis category is the expected number of PPCs for the severity levels.

In this example, the expected number of PPCs for the APR DRG category is 56.5, which is then compared to the observed number of discharges with PPCs (45). Thus, the hospital had 11.5 fewer observed discharges with PPCs than were expected for 500 at-risk discharges in this APR DRG category. This difference can be expressed as a percentage difference as well.

All APR-DRG categories and their SOI levels are included in the computation of the observed and expected rates, except when the APR-DRG SOI level has less than 30 at-risk discharges statewide.

PPC Exclusions

Consistent with prior MHAC policies, the number of at-risk discharges is determined prior to the calculation of the normative values (hospitals with <10 at-risk discharges are excluded for a particular PPC) and the normative values are then re-calculated after removing PPCs with <2 complication expected. The following exclusions will also be applied:

For each hospital, discharges will be removed if:

- Discharge is in an APR-DRG SOI cell has less than 31 statewide discharges.
- Discharge has a diagnosis of palliative care (this exclusion may be removed in the future once POA status is available for palliative care for the data used to determine performance standards); and
- Discharge has more than 6 PPCs (i.e., a catastrophic case, for which complications are probably not preventable).

For each hospital, PPCs will be removed if during FY 2018 and FY 2019:

- The number of cases at-risk is less than 20; and
- The expected number of PPCs is less than 2.

The PPCs for which a hospital will be assessed are determined using the FY 2018 and FY 2019 data and not reassessed during the performance period. This is done so that scores can be reliably calculated

during the performance period from a pre-determined set of PPCs. The MHAC summary workbooks provide the excluded PPCs for each hospital.

Combination PPCs

Based on clinical input and 3M recommendation, starting in RY 2021 two pneumonia (PPC 5 Pneumonia & Other Lung Infections & PPC 6 Aspiration Pneumonia) PPCs were combined into single pneumonia PPC and the 3M cost weight is a simple average of the two PPC cost weights.

Hospital Exclusions

For RY 2022, McCready and UM-Chestertown are removed because they do not have sufficient volume to have at least 20 at-risk and 2 expected for any payment program PPC.

Benchmarks and Thresholds

For each PPC, a threshold and benchmark value are calculated using the FY 2018 and FY 2019 data. In previous rate years when improvement as also assessed, the threshold was set at the statewide median of 1 and the benchmark was the O/E ratio for the top performing hospitals that accounted for 25% of discharges. For RY 2021 under an attainment only methodology, staff adapted the MHAC points system to allow for greater performance differentiation by moving the threshold to the value of the observed to expected ratio at the 10th percentile of hospital performance, moving the benchmark to the value of the observed to expected ratio at the 90th percentile of hospital performance, and assigning 0 to 100 points for each PPC between these two percentile values. Figure 3 provides the thresholds and benchmarks under this revised methodology based on FY 2018 and FY 2019 data.

Figure 3: RY 2022 Thresholds and Benchmarks for all 14 Payment Program PPCs

PPC Number	PPC Description	Threshold	Benchmark
3	Acute Pulmonary Edema and Respiratory Failure without Ventilation	1.8882	0.3348
4	Acute Pulmonary Edema and Respiratory Failure with Ventilation	1.4274	0.4933
7	Pulmonary Embolism	1.5660	0.3091
9	Shock	1.6965	0.3727
16	Venous Thrombosis	1.7715	0.1242
28	In-Hospital Trauma and Fractures	1.5749	0.4468
35	Septicemia & Severe Infections	1.5732	0.3891
37	Post-Operative Infection & Deep Wound Disruption Without Procedure	1.9911	0.4162
41	Post-Operative Hemorrhage & Hematoma with Hemorrhage Control Procedure or I&D Proc	2.4933	0.4362
42	Accidental Puncture/Laceration During Invasive Procedure	2.1677	0.3735
49	Iatrogenic Pneumothrax	1.6971	0.3351
60	Major Puerperal Infection and Other Major Obstetric Complications	1.6266	0
61	Other Complications of Obstetrical Surgical & Perineal Wounds	1.8975	0
67	Combined Pneumonia (PPC 5 and 6)	1.6422	0.3986

Attainment Points (possible points 0-100)

If the PPC ratio for the performance period is greater than the threshold, the hospital scores zero points for that PPC for attainment.

If the PPC ratio for the performance period is less than or equal to the benchmark, the hospital scores a full 100 points for that PPC for attainment.

If the PPC ratio is between the threshold and benchmark, the hospital scores partial points for attainment. The formula to calculate the Attainment points is as follows:

- Attainment Points = [99 * ((Hospital's performance period score - Threshold)/ (Benchmark – Threshold))] + 0.5

Calculation of Hospital Overall MHAC Score

To calculate the final score for each hospital, the attainment points earned by the hospital and the potential points (i.e., 100) for each PPC are multiplied by the 3M cost weights. Hospital scores across PPCs are calculated by summing the total weighted points earned by a hospital, divided by the total possible weighted points (100 per PPC * 3M cost weight). Figure 5 provides a hypothetical example of the points based scoring approach with the 3M cost weights.

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Appendix III: Monitoring PPCs

Table provides the CY 2018 and CY 2019 statewide observed and expected PPCs, sorted by the PPC that have the largest contribution to the total observed increase in the monitoring PPCs. The top 10 PPCs contributing the observed increase are highlighted in red.

		Observed					Expected			O/E Ratio		
PPC #	PPC Description	2018	2019	Percent change	Observed Simple Difference	Percent Contribution	2018	2019	Percent change	2018	2019	Percent change
52	Inflammation & Other Complications of Devices, Implants or Grafts Except Vascular Infection	278	434	56.1%	156	12.64%	296.84	296.05	-0.3%	0.94	1.47	56.5%
14	Ventricular Fibrillation/Cardiac Arrest	605	723	19.5%	118	9.56%	631.43	643.58	1.9%	0.96	1.12	17.2%
40	Post-Operative Hemorrhage & Hematoma without Hemorrhage Control Procedure or I&D Proc	477	594	24.5%	117	9.48%	503.69	492.54	-2.2%	0.95	1.21	27.3%
50	Mechanical Complication of Device, Implant & Graft	207	319	54.1%	112	9.08%	217.02	215.83	-0.5%	0.95	1.48	55.0%
1	Stroke & Intracranial Hemorrhage	272	368	35.3%	96	7.78%	299.38	297.66	-0.6%	0.91	1.24	36.1%
59	Medical & Anesthesia Obstetric Complications	103	191	85.4%	88	7.13%	115.18	111.29	-3.4%	0.89	1.72	91.9%
8	Other Pulmonary Complications	138	215	55.8%	77	6.24%	162.04	159.30	-1.7%	0.85	1.35	58.5%
51	Gastrointestinal Ostomy Complications	76	149	96.1%	73	5.92%	81.73	84.98	4.0%	0.93	1.75	88.5%
64	Other In-Hospital Adverse Events	82	150	82.9%	68	5.51%	107.67	106.26	-1.3%	0.76	1.41	85.3%
11	Acute Myocardial Infarction	290	354	22.1%	64	5.19%	302.06	304.76	0.9%	0.96	1.16	21.0%

		Observed					Expected			O/E Ratio		
PPC #	PPC Description	2018	2019	Percent change	Observed Simple Difference	Percent Contribution	2018	2019	Percent change	2018	2019	Percent change
48	Other Complications of Medical Care	77	137	77.9%	60	4.86%	82.09	82.54	0.5%	0.94	1.66	76.9%
17	Major Gastrointestinal Complications without Transfusion or Significant Bleeding	101	149	47.5%	48	3.89%	95.34	95.26	-0.1%	1.06	1.56	47.7%
20	Other Gastrointestinal Complications without Transfusion or Significant Bleeding	264	311	17.8%	47	3.81%	255.10	253.03	-0.8%	1.03	1.23	18.8%
13	Other Cardiac Complications	53	99	86.8%	46	3.73%	66.05	66.81	1.2%	0.80	1.48	84.7%
15	Peripheral Vascular Complications Except Venous Thrombosis	71	117	64.8%	46	3.73%	78.53	77.80	-0.9%	0.90	1.50	66.3%
27	Post-Hemorrhagic & Other Acute Anemia with Transfusion	211	253	19.9%	42	3.40%	258.03	260.67	1.0%	0.82	0.97	18.7%
47	Encephalopathy	91	130	42.9%	39	3.16%	77.83	74.09	-4.8%	1.17	1.75	50.1%
33	Cellulitis	198	236	19.2%	38	3.08%	176.31	171.26	-2.9%	1.12	1.38	22.7%
23	GU Complications Except UTI	67	102	52.2%	35	2.84%	61.95	61.77	-0.3%	1.08	1.65	52.7%
31	Decubitus Ulcer	40	66	65.0%	26	2.11%	38.35	37.39	-2.5%	1.04	1.77	69.2%
2	Extreme CNS Complications	100	121	21.0%	21	1.70%	65.38	66.06	1.0%	1.53	1.83	19.8%
19	Major Liver Complications	75	94	25.3%	19	1.54%	76.09	77.29	1.6%	0.99	1.22	23.4%
34	Moderate Infections	49	68	38.8%	19	1.54%	39.03	39.76	1.9%	1.26	1.71	36.2%
29	Poisonings Except from Anesthesia	28	46	64.3%	18	1.46%	31.27	30.81	-1.5%	0.90	1.49	66.7%
18	Major Gastrointestinal Complications with Transfusion or Significant Bleeding	21	38	81.0%	17	1.38%	26.01	25.07	-3.6%	0.81	1.52	87.7%
10	Congestive Heart Failure	29	40	37.9%	11	0.89%	60.32	59.87	-0.8%	0.48	0.67	39.0%

		Observed					Expected			O/E Ratio		
PPC #	PPC Description	2018	2019	Percent change	Observed Simple Difference	Percent Contribution	2018	2019	Percent change	2018	2019	Percent change
53	Infection, Inflammation & Clotting Complications of Peripheral Vascular Catheters & Infusions	44	50	13.6%	6	0.49%	58.07	57.55	-0.9%	0.76	0.87	14.7%
25	Renal Failure with Dialysis	18	23	27.8%	5	0.41%	21.59	20.81	-3.6%	0.83	1.11	32.6%
38	Post-Operative Wound Infection & Deep Wound Disruption with Procedure	3	8	166.7%	5	0.41%	5.33	5.43	1.8%	0.56	1.47	161.9%
26	Diabetic Ketoacidosis & Coma	8	12	50.0%	4	0.32%	5.48	5.30	-3.3%	1.46	2.26	55.1%
54	Infections due to Central Venous Catheters	13	17	30.8%	4	0.32%	9.86	9.76	-1.0%	1.32	1.74	32.1%
44	Other Surgical Complication - Mod	23	24	4.3%	1	0.08%	27.54	27.36	-0.6%	0.84	0.88	5.0%
45	Post-procedure Foreign Bodies	9	10	11.1%	1	0.08%	11.91	11.78	-1.1%	0.76	0.85	12.4%
30	Poisonings due to Anesthesia	0	0		0	0.00%	0.00	0.00				
32	Transfusion Incompatibility Reaction	0	0		0	0.00%	0.51	0.47	-7.0%	0.00	0.00	
63	Post-Operative Respiratory Failure with Tracheostomy	1	1	0.0%	0	0.00%	0.85	0.78	-9.0%	1.17	1.29	9.9%
66	Catheter-Related Urinary Tract Infection	9	8	-11.1%	-1	-0.08%	13.01	13.42	3.2%	0.69	0.60	-13.8%
21	Clostridium Difficile Colitis	335	325	-3.0%	-10	-0.81%	365.66	362.01	-1.0%	0.92	0.90	-2.0%
39	Reopening Surgical Site	212	202	-4.7%	-10	-0.81%	206.26	201.70	-2.2%	1.03	1.00	-2.6%
65	Urinary Tract Infection without Catheter	1441	1169	-18.9%	-272	-22.04%	1276.74	1266.58	-0.8%	1.13	0.92	-18.2%
	Statewide Total	6119	7353	20.2%	1234	100.00%	6207.47	6174.6705	-0.5%	0.99	1.19	20.8%

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Appendix IV: RY 2021 Hospital Revenue Adjustments

Hospital ID	Hospital Name	RY20 estimated Permanent Inpatient Revenue	RY 2021 MHAC score	% Adjustment	$ Adjustment
210001	MERITUS	$216,047,620	0.67	0.00%	$0
210002	UNIVERSITY OF MARYLAND	$1,233,326,321	0.82	0.80%	$9,866,611
210003	PRINCE GEORGE	$263,362,395	0.56	-0.13%	-$351,150
210004	HOLY CROSS	$364,173,616	0.87	1.13%	$4,127,301
210005	FREDERICK MEMORIAL	$234,941,977	0.52	-0.27%	-$626,512
210006	HARFORD	$54,600,073	0.72	0.13%	$72,800
210008	MERCY	$245,183,638	0.71	0.07%	$163,456
210009	JOHNS HOPKINS	$1,537,015,348	0.72	0.13%	$2,049,354
210010	DORCHESTER	$20,517,421	0.96	1.73%	$355,635
210011	ST. AGNES	$249,225,510	0.59	-0.03%	-$83,075
210012	SINAI	$443,754,886	0.73	0.20%	$887,510
210015	FRANKLIN SQUARE	$308,852,743	0.56	-0.13%	-$411,804
210016	WASHINGTON ADVENTIST	$179,748,715	0.82	0.80%	$1,437,990
210017	GARRETT COUNTY	$23,013,699	1.00	2.00%	$460,274
210018	MONTGOMERY GENERAL	$84,740,050	0.48	-0.40%	-$338,960
210019	PENINSULA REGIONAL	$259,801,805	0.88	1.20%	$3,117,622
210022	SUBURBAN	$217,601,944	0.74	0.27%	$580,272
210023	ANNE ARUNDEL	$319,692,560	0.78	0.53%	$1,705,027
210024	UNION MEMORIAL	$258,558,976	0.54	-0.20%	-$517,118
210027	WESTERN MARYLAND HEALTH SYSTEM	$175,599,914	0.64	0.00%	$0
210028	ST. MARY	$79,305,037	0.87	1.13%	$898,790
210029	HOPKINS BAYVIEW MED CTR	$387,945,804	0.73	0.20%	$775,892
210030	CHESTERTOWN	$12,714,284	0.51	-0.30%	-$38,143
210032	UNION HOSPITAL OF CECIL COUNT	$68,136,813	0.46	-0.47%	-$317,972
210033	CARROLL COUNTY	$148,800,274	0.81	0.73%	$1,091,202
210034	HARBOR	$122,188,828	0.52	-0.27%	-$325,837
210035	CHARLES REGIONAL	$81,088,630	0.65	0.00%	$0
210037	EASTON	$109,482,743	0.93	1.53%	$1,678,735
210038	UMMC MIDTOWN	$107,704,022	0.77	0.47%	$502,619
210039	CALVERT	$70,993,520	0.69	0.00%	$0
210040	NORTHWEST	$140,549,546	0.89	1.27%	$1,780,294
210043	BALTIMORE WASHINGTON MEDICAL CENTER	$266,416,072	0.79	0.60%	$1,598,496
210044	G.B.M.C.	$247,198,765	0.57	-0.10%	-$247,199
210048	HOWARD COUNTY	$186,112,399	0.69	0.00%	$0
210049	UPPER CHESAPEAKE HEALTH	$157,270,395	0.84	0.93%	$1,467,857
210051	DOCTORS COMMUNITY	$148,830,231	0.87	1.13%	$1,686,743
210056	GOOD SAMARITAN	$161,237,653	0.84	0.93%	$1,504,885
210057	SHADY GROVE	$284,505,304	0.64	0.00%	$0
210058	REHAB & ORTHO	$72,597,733	0.72	0.13%	$96,797
210060	FT. WASHINGTON	$21,696,655	0.96	1.73%	$376,075
210061	ATLANTIC GENERAL	$40,634,326	0.91	1.40%	$568,881
210062	SOUTHERN MARYLAND	$175,194,855	0.64	0.00%	$0
210063	UM ST. JOSEPH	$251,546,336	0.80	0.67%	$1,676,976
210064	LEVINDALE	$59,673,579	0.69	0.00%	$0
210065	HC-Germantown	$70,744,547	0.99	1.93%	$1,367,728
	State Total	**$10,162,327,560**		**State Total**	**$38,638,052**
				Penalty	**-$3,257,770**
				% Inpatient	**-0.03%**
				Reward	**$41,895,822**
				% Inpatient	**0.41%**