maryland
health services
cost review commission

Final Recommendation for the Maryland Hospital Acquired Conditions Program
for Rate Year 2024

January 12, 2022

taff recommendations for the Maryland Hospital Acquired Conditions Program for RY 2024.

Table of Contents

Table of Contents

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

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.

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 inpatient 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 2024 final recommendation, in general, maintains the measures and methodology that were developed and approved for RYs 2022 and 2023.[1]

These are the final recommendations for the RY 2024 Maryland Hospital Acquired Conditions (MHAC) program:

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. Assess monitoring PPCs based on clinical recommendations, statistical characteristics, and recent trends to prioritize those for future consideration for updating the measures in the payment program.
   c. Engage hospitals on specific PPC increases to understand trends and discuss potential quality concerns.
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 and 2022.
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 retrospectively the RY 2024 MHAC pay-for-performance program methodology as needed due to COVID-19 Public Health Emergency and report any changes to Commissioners.

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

Introduction

Maryland hospitals have been funded under a population-based revenue system with a fixed annual revenue cap under the All-Payer Model agreement with the Centers for Medicare & Medicaid Services (CMS) beginning in 2014, and continuing under the current Total Cost of Care (TCOC) Model agreement, which took effect in 2019. Under the global budget 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 and hospital quality (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 global budget system, while guarding against unintended consequences and penalizing poor performance.

The Maryland Hospital Acquired Conditions (MHAC) program is one of several quality pay-for-performance initiatives that provide incentives for hospitals to improve and maintain high-quality patient care and value over time. The program currently holds 2 percent of hospital revenue at-risk for hospital acquired 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.

For MHAC, as well as the other State hospital quality programs, annual updates are vetted with stakeholders and approved by the Commission to ensure the programs remain aggressive and progressive with results that meet or surpass those of the national CMS analogous programs (from which Maryland must receive annual exemptions). For purposes of the RY 2024 MHAC Policy, staff had two meetings in October and November with the Performance Measurement Workgroup (PMWG), which is a standing advisory group that meets monthly to discuss Quality policies.

Additionally, with the onset of the Total Cost of Care Model Agreement with CMS on January 1, 2019, each program was overhauled to ensure they support the goals of the Model. For the MHAC policy, the overhaul was completed during 2018, which entailed an extensive stakeholder engagement effort that included six meetings with the Clinical Adverse Events Measurement (CAEM) subgroup and two meetings with the PMWG during 2018. 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 weighing 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 revenue adjustment scale with a hold harmless zone.

In light of the recent MHAC program redesign, and the ongoing COVID-19 Public Health Emergency (PHE), this RY 2024 MHAC policy proposes minimal changes to the program. The assessment section does, however, include an evaluation of PPCs in "Monitoring" status because the approved recommendations for RY 2021 and future rate years included identifying PPCs that due to worsening performance should be included back into the MHAC program. Furthermore, the assessment section outlines necessary timeline changes and the current plan to assess the impact of COVID-19 for both the RYs 2023 and 2024 policy; as with the RY 2023 this policy includes a recommendation to retrospectively adjust the program as needed to provide the fairest assessment of hospital quality.

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 global budget 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 progressive, i.e. that Maryland's performance meets or surpasses that of the nation. Specifically, the State must ensure that the improvements in complication rates observed under the All-Payer Model through 2018 are maintained throughout the TCOC model. Based on the 2020 PPC results, CMS granted Maryland exemption from the federal pay-for-performance programs (including the HAC Reduction Program) for Federal Fiscal Year 2022 on October 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 for eligible secondary diagnosis codes available in claims data. 3M originally developed specifications for 65 PPCs[2], 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 venous thrombosis and sepsis 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 Methodology

Figure 1 provides an overview of the three steps in the RY 2023 MHAC methodology[3] that converts hospital performance to standardized scores, and then payment adjustments, as outlined below:

> **Step 1.** For the PPCs identified for payment, clinically-determined global and PPC-specific exclusions, as well as volume based hospital-level exclusions are identified to ensure fairness in assignment of complications.

> **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

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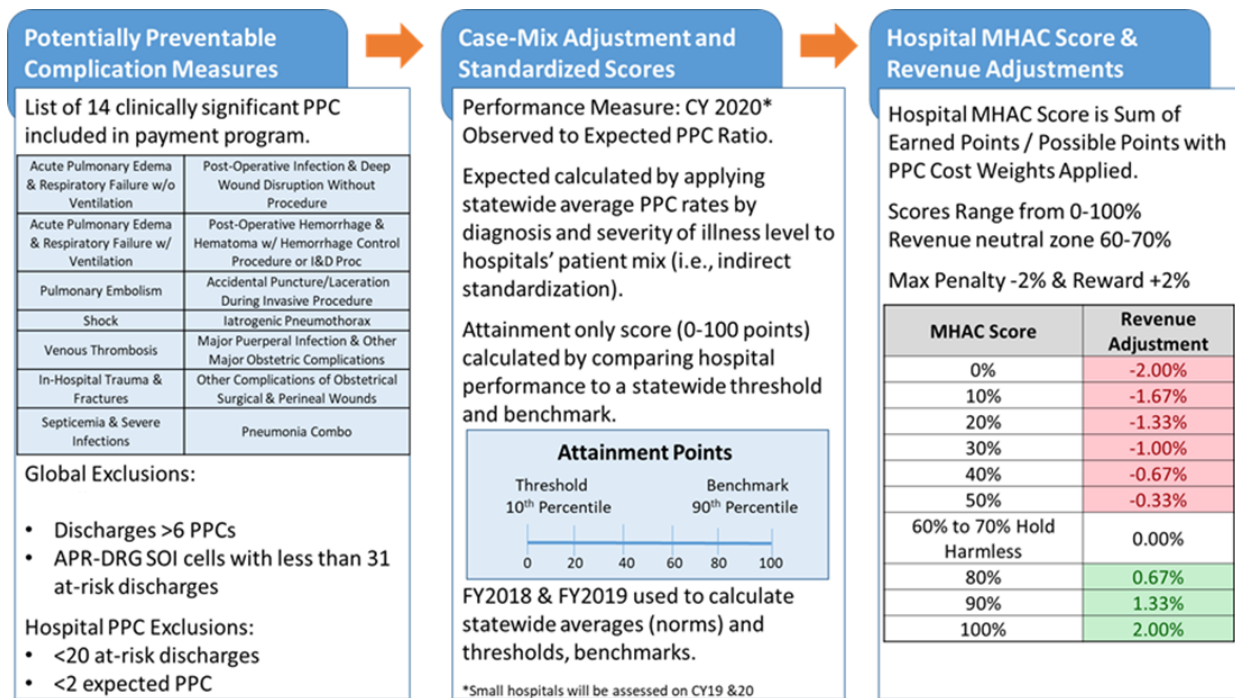[2] In RY 2020, there were 45 PPCs or PPC combinations included in the program, from an initial 65 PPCs in the software, as 3M had discontinued some PPCs and others were deemed not suitable for a pay-for-performance program.
[3] Due to COVID-19 PHE, this methodology will need to be retrospectively adjusted, pending future CMS guidance, assessment of performance standards, and to address any future surge in COVID cases.

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.

Because of the ongoing COVID PHE, staff working with PMWG and other stakeholders is currently considering retrospective adjustments to the approved RY 2023 methodology outlined above and illustrated in Figure 1 below. Among the changes being considered are inclusion versus exclusion of COVID patients, updates to the base and performance periods, and updates to the performance standards. Additional information on the current MHAC policy for RY 2023 can be found in Appendix II.

Figure 1. Overview Rate Year 2023 MHAC Methodology

Potentially Preventable Complication Measures

List of 14 clinically significant PPC included in payment program.

Acute Pulmonary Edema & Respiratory Failure w/o Ventilation	Post-Operative Infection & Deep Wound Disruption Without Procedure
Acute Pulmonary Edema & Respiratory Failure w/ Ventilation	Post-Operative Hemorrhage & Hematoma w/ Hemorrhage Control Procedure or I&D Proc
Pulmonary Embolism	Accidental Puncture/Laceration During Invasive Procedure
Shock	Iatrogenic Pneumothorax
Venous Thrombosis	Major Puerperal Infection & Other Major Obstetric Complications
In-Hospital Trauma & Fractures	Other Complications of Obstetrical Surgical & Perineal Wounds
Septicemia & Severe Infections	Pneumonia Combo

Global Exclusions:

- Discharges >6 PPCs
- APR-DRG SOI cells with less than 31 at-risk discharges

Hospital PPC Exclusions:
- <20 at-risk discharges
- <2 expected PPC

Case-Mix Adjustment and Standardized Scores

Performance Measure: CY 2020* Observed to Expected PPC Ratio.

Expected calculated by applying statewide average PPC rates by diagnosis and severity of illness level to hospitals' patient mix (i.e., indirect standardization).

Attainment only score (0-100 points) calculated by comparing hospital performance to a statewide threshold and benchmark.

Attainment Points

Threshold — 10th Percentile
Benchmark — 90th Percentile

0   20   40   60   80   100

FY2018 & FY2019 used to calculate statewide averages (norms) and thresholds, benchmarks.

*Small hospitals will be assessed on CY19 &20

Hospital MHAC Score & Revenue Adjustments

Hospital MHAC Score is Sum of Earned Points / Possible Points with PPC Cost Weights Applied.

Scores Range from 0-100% Revenue neutral zone 60-70%

Max Penalty -2% & Reward +2%

MHAC Score	Revenue Adjustment
0%	-2.00%
10%	-1.67%
20%	-1.33%
30%	-1.00%
40%	-0.67%
50%	-0.33%
60% to 70% Hold Harmless	0.00%
80%	0.67%
90%	1.33%
100%	2.00%

Assessment

In order to develop the RY 2024 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 2024 MHAC program. Staff is still soliciting input on selecting monitoring PPCs with increasing rate trends to include back in the program. This section of the report provides an overview of the data and issues discussed by the PMWG, including analysis of statewide PPC trends—for those used for payment, under

monitoring, and overall—and discussion of COVID-19 related changes and analyses that need to be done to fairly assess hospital performance.

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 Clinical Adverse Events Measures (CAEM) subgroup that are outlined in the "Monitored Complications" section below.

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 June CY 2021.[4] 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 2 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.[5] Specifically, there has been a 26% decrease in the ratio based on the most recent data available (CY 2018 O/E ratio = 1.06 and CY 2021 YTD O/E ratio = 0.78). PPCs in the MHAC program include:

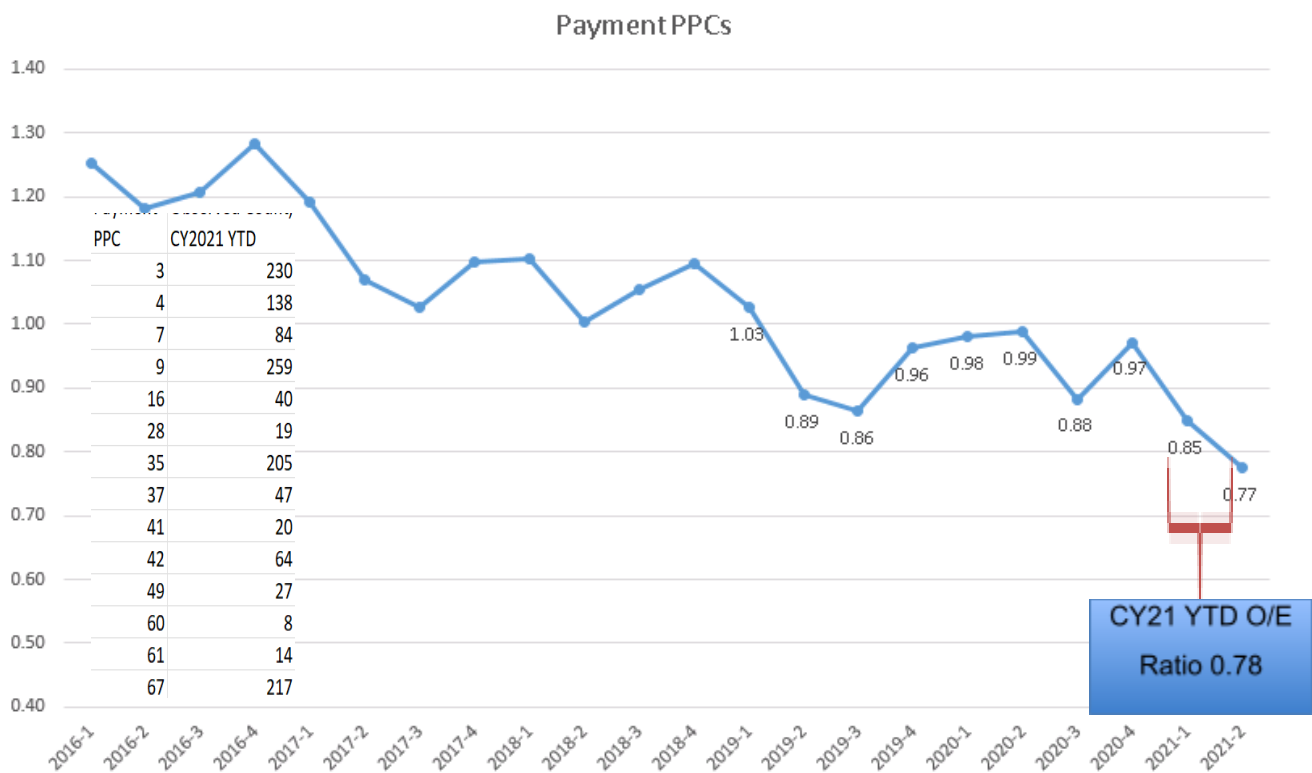|	
3	Acute Pulmonary Edema and Resp Failure w/o Ventilation
4	Acute Pulmonary Edema, Resp Failure w/ventilation
7	Pulmonary Embolism
9	Shock
16	Venous Thrombosis
28	In-Hospital Trauma and Fractures
35	Septicemia & Severe Infections

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[4] Staff notes that, consistent with federal policies during the COVID Public Health Emergency, PPC data from January-June 2020 will not be used for assessing quality of care.
[5] The O/E ratios presented here are calculated with COVID-19 discharges removed; a final decision on whether to include or exclude COVID-19 discharges has not yet been made for RYs 2023 and 2024.

| 37 | Post-Operative Infection & Deep Wound Disruption Without Procedure |
41	Post-Operative Hemorrhage & Hematoma w/ Hemorrhage Control Procedure or I&D
42	Accidental Puncture/ Laceration During Invasive Procedure
49	Iatrogenic Pneumothorax
60	Major Puerperal Infection and Other Major Obstetric Complications
61	Other Complications of Obstetrical Surgical & Perineal Wounds
67	Pneumonia Combo (with and without aspiration)

Figure 2. Payment Program PPCs Quarterly Observed to Expected Ratios CY 2016 to CY 2021 June

Payment PPCs

PPC	CY2021 YTD
3	230
4	138
7	84
9	259
16	40
28	19
35	205
37	47
41	20
42	64
49	27
60	8
61	14
67	217

CY21 YTD O/E Ratio 0.78

In terms of specific improvements among the 14 payment PPCs, Figure 3 shows the O/E ratios for CY 2019 and CY 2021 YTD, sorted from greatest percent increase (on the left) to greatest decrease (on the right). The four PPCs that worsened during this time period include PPC 3- Acute Pulmonary Edema and Respiratory Failure without Ventilation, PPC 60- Major Puerperal Infection and Other Major Obstetric Complication, PPC 7- Pulmonary Embolism, and PPC 35- Septicemia and Severe Infections. The three PPCs with the greatest decreases include PPC 42- Accidental Puncture/Laceration During Invasive

Procedure, PPC 37- Post- Operative Infection and Deep Wound Disruption Without Procedure, and PPC 16- Venous Thrombosis.

Figure 3. Payment Program PPC Observed to Expected Ratios CY 2019 and FY 2021
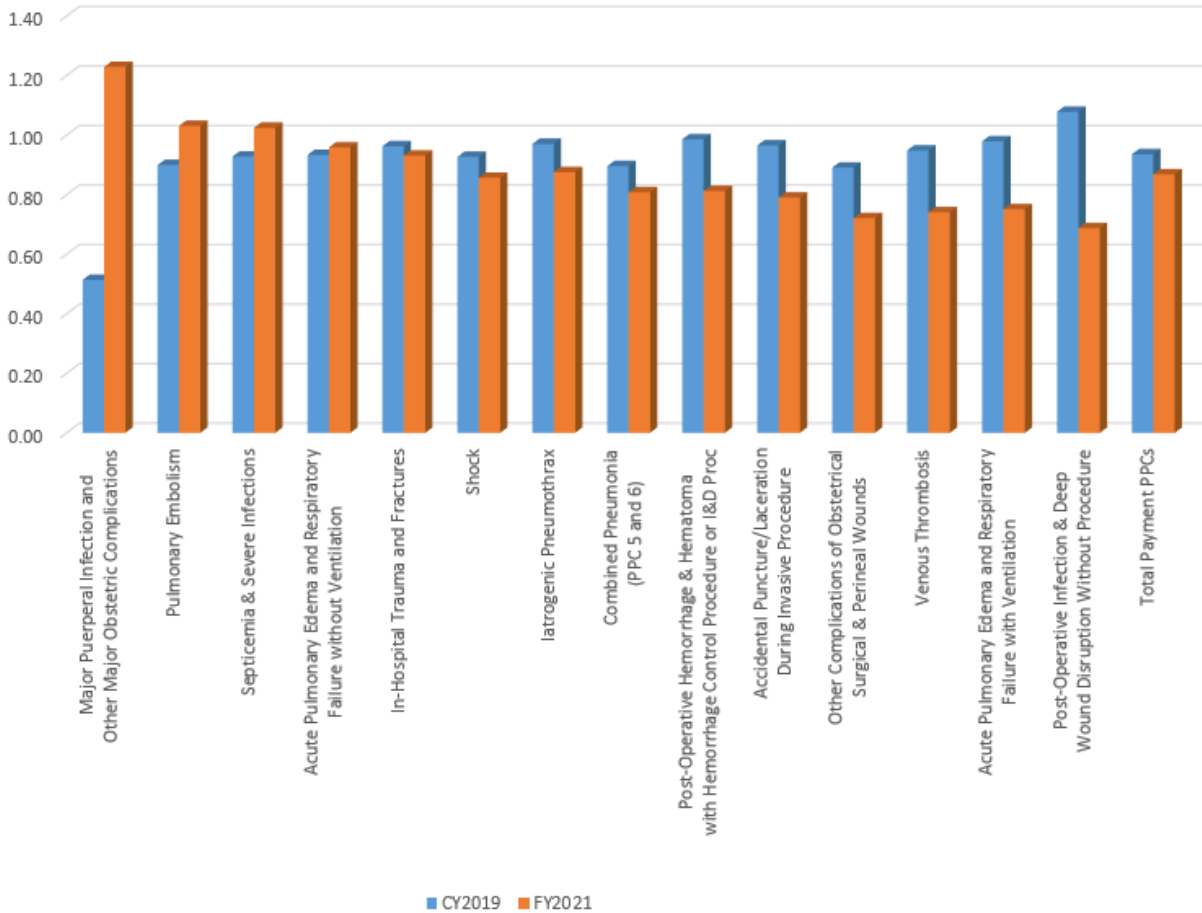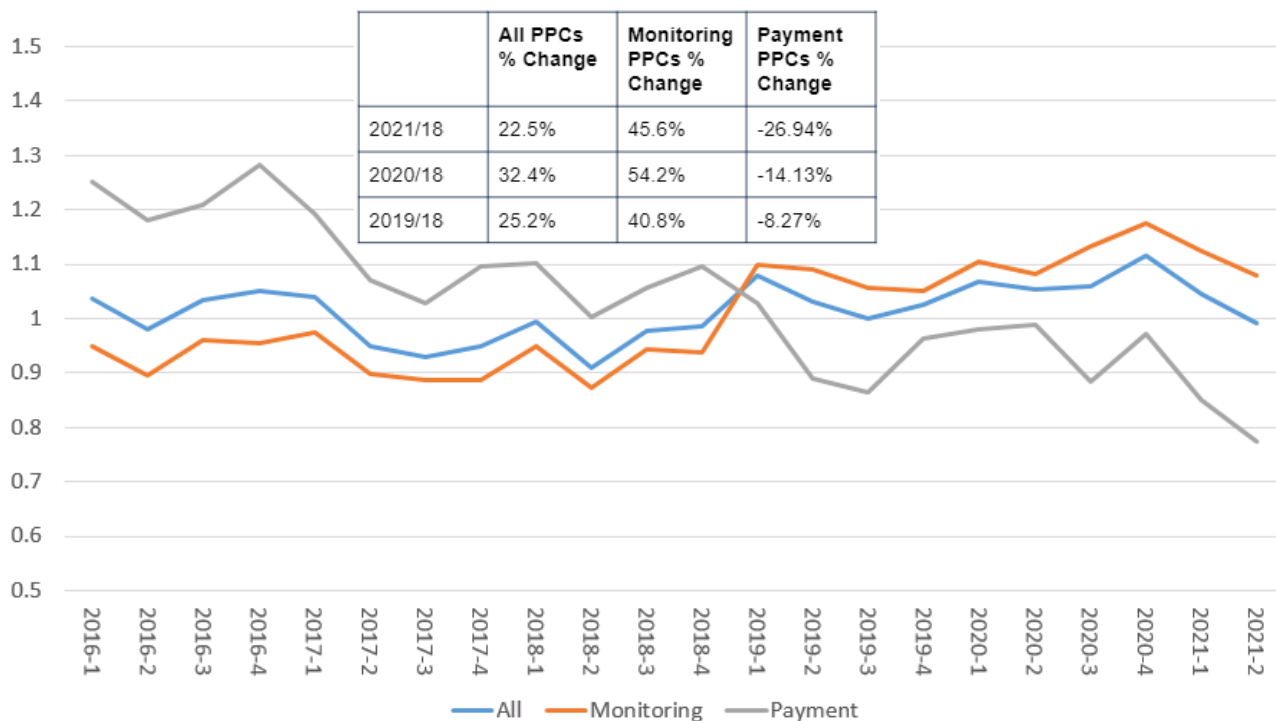

Monitored Complications

In addition to focusing on a narrowed list of PPCs for payment, as stated previously, 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. The overall PPC trend across all 54 PPCs shows that there has been a slight increase in the overall statewide O/E ratio from 0.98 in CY 2018 to 1.01 in CY 2021 YTD; 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 2023 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, last year staff had planned to analyze data for CY 2019 through June 2020 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 for January-June 2020, staff did not recommend any PPCs be moved back into the payment program for RY 2023, but maintained 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 ratios for the monitoring PPCs sorted by the observed PPCs that accounted for the largest proportion of the increase from 2018 to 2021 YTD through June.

Figure 4. PPC O/E Ratio Trends CY 2016 Through CY 2021 Qtr 2

	All PPCs % Change	Monitoring PPCs % Change	Payment PPCs % Change
2021/18	22.5%	45.6%	-26.94%
2020/18	32.4%	54.2%	-14.13%
2019/18	25.2%	40.8%	-8.27%

*Note: This analysis excludes COVID-19 patients. The percent change table is only a reflection of the first and second quarters of the specified years.

As mentioned previously, the MHAC redesign process assessed which PPCs should be included in the pay-for-performance program based on criteria developed by the Clinical Adverse Events Measures

(CAEM) subgroup. To support determining the monitored PPCs that are the best candidates for re-adopting into the payment program, staff and stakeholders are using the previously established criteria that include:

- PPC Data Analysis/Statistics
  - Greater than 50% increase in O/E ratio comparing 2021 to 2018
  - Rate per 1,000 generally 0.5 or above
  - Volume of observed events 100 or above (over two years)
  - Significant variation across hospitals O/E ratios less than .85 or greater than 1.15
  - At least half of the hospitals are eligible for the PPC
- Additional Considerations
  - PSI overlap
  - Clinical significance
  - Opportunity for improvement
  - All-payer

Based on staff assessment to date of monitored PPC trends and the criteria above, staff vetted the PPCs listed below with PMWG stakeholders. In addition to adjusting the expected rates at each hospital by their APR-DRG Severity of Illness (SOI) patient mix, staff has noted that the MHAC program also relies on the work of 3M to review the PPC clinical logic and perform PPC Grouper updates annually. Staff has encouraged stakeholders, particularly clinicians, to review 3M updated global exclusion logic and PPC-specific assignment and exclusion logic and to weigh in on the monitored PPCs they believe are best to include in the payment program. Staff has established two tiers of PPCs currently monitored to consider for use in the payment program.

- Strongly Consider
  - 31: Decubitus Ulcer
  - 51: Gastrointestinal Ostomy Complications
  - 47: Encephalopathy
  - 26: Diabetic Ketoacidosis & Coma
  - 50: Mechanical Complication of Device, Implant & Graft
  - 45: Post Procedure Foreign Body
- Consider
  - 15: Peripheral Vascular Complication except Venous Thrombosis
  - 23: Genitourinary Complications except UTI
  - 34: Moderate Infections

- - 18: Major GI Complications w/ Transfusion or Significant Bleeding
  - 13: Other Cardiac Complications
  - 17: Major GI Complications w/o Transfusion or Significant Bleeding (Possibly combine with PPC #18)

Again, as stated above, staff is committed to ensuring that the additional monitored complication measures that are areas of concern and are deemed appropriate for a pay-for-performance program, if any, are proposed for re-inclusion. In the PMWG meetings staff convened in October and November as well as in the draft recommendation document, staff invited stakeholder input on the monitored PPC's listed for potential inclusion, particularly those indicated as "Strongly Consider." As outlined in the "Stakeholder Feedback and Responses" section below in this final RY 2024 MHAC recommendation, staff outlines stakeholder feedback received to date on this subject. Staff also provides rationale for not recommending additional PPCs for re-inclusion in the payment program at this time. In addition, staff outlines a process for investigations with specific hospitals/systems regarding the potential drivers of increasing observed/expected ratios in the monitored PPCs of concern, and for ongoing public stakeholder dialogue to determine PPC future updates based on the outlined criteria and any additional clinical feedback.

COVID-19 Program Adjustments

RY 2024 Changes to Timelines

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. Thus, the two-year base period for establishing performance standards (normative values, and the benchmarks/thresholds) needs to be modified for RY 2024 to exclude this 6 month period. The proposed base period for RY 2024 will be July 2020 through CY 2021 (see below for discussion of concurrent performance standards). This change shortens the base period by 6 months and will delay the availability of normative values and the benchmarks/thresholds until final data for all of CY 2021 is received. While this change does violate the guiding principles of our programs to be prospective and to allow hospital track performance during the performance period, these adjustments as well as potentially retrospective adjustments discussed below are necessitated by the unprecedented COVID PHE.

Assessing Performance During COVID

For both RY 2023 and RY 2024, retrospective changes may be needed to more fairly assess hospital performance. In the RY 2023 policy staff proposed to include COVID-19 related discharges to ensure

quality of care was being monitored for all patients. However, staff recognize that the normative values for calculating expected complications during the performance period and the benchmarks/thresholds for scoring hospital performance are using a pre-COVID base period. Thus, for RY 2023 the staff is currently working with Mathematica Policy Research (MPR) to evaluate the impact of COVID on hospital performance. Specifically, as shown in Figure 5, MPR is going to assess the impact of concurrent norms (i.e., using the performance period to develop performance standards as opposed to a historical time period) with and without COVID-19 discharges on hospitals scores, model fit, reliability and validity, hospital rankings relative to COVID volumes, impact on specific DRGS (e.g., Major Respiratory infections and inflammations, sepsis), and equity considerations. The PMWG has reviewed this analysis plan and staff will be bringing results to PMWG over the next few months. The staff anticipates proposing any updates for RY 2023 by March 2022. These decisions may then be carried over or reassessed for RY 2024. As discussed in PMWG, the changes needed due to COVID will continue to impact the Maryland quality programs for the foreseeable future. As always the staff appreciate the input of stakeholders and the patience of the hospital industry as we work to ensure the fairest approach for quality assessment.

Figure 5. MHAC Program COVID Analytics Models

Models Under Consideration	Model 1 *original baseline period*	Model 2a *concurrent norms with COVID-19 cases*	Model 2b *concurrent norms without COVID-19 cases*
Description	original base period norms	concurrent norms including COVID-19 cases	concurrent norms excluding COVID-19 cases from normative values and performance period calculations

Palliative Care Update

Last year for RY 2023, the MHAC program adjusted its methodology to not exclude palliative care cases because there was data on whether palliative care cases were present-on-admission. The 3M PPC grouper then could assign PPCs to discharges where palliative care was not present-on-admission. This addressed a long-standing concern among HSCRC staff that complications were being missed that caused

a patient to go into palliative care during the hospitalization. Unfortunately, starting in October 2021 the palliative care diagnosis is again exempt from POA coding. While 3M plans to assess and update the PPC grouper in future years to clinically determine which complications should be assigned to all patients with a palliative care diagnosis, in the meantime the HSCRC staff will remove discharges with palliative care from October-December 2021 and for all of CY 2022. The RY 2025 policy will re-evaluate palliative care Coding Clinic updates, PPC trend results with/without palliative care, and clinical updates to the PPC grouper v.40 to determine if the palliative care exclusion can be removed.

Hospital Scores and Revenue Adjustments

This final policy does not present modeling of the RY 2024 results since there are no changes to the methodology or revenue adjustment scale. Furthermore, there are likely to be retrospective changes (e.g., use of concurrent norms) to the methodology due to COVID, making the modeling potentially meaningless. The revenue adjustment scale recommended in this policy ranges from 0 to 100 percent, with a hold harmless zone between 60 and 70 percent. The revenue adjustment scale is normally determined by looking at the distribution of scores from modeling but has not changed since the RY 2021 redesign. 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. Based on this scale, the RY 2021 MHAC program had net revenue adjustments of about $39M ($3M penalties, $42M rewards). These revenue adjustments reflect the continued improvement on complications during the TCOC model.

Additional Future Considerations

Staff continue to believe that it is important 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 and the COVID-19 PHE emergency has made this type of benchmarking much more difficult. In the meantime, staff will be assessing hospital performance on the all-payer Patient Safety Indicators, which includes some complications that are similar to the payment and monitoring PPCs but may be able to provide a national comparison.

As Maryland hospitals continue to improve on payment PPCs, staff are wanting to pursue statistical methods that will better address small cell size issues and statistical reliability and validity. Thus, over the coming years, staff will work with our contractor MPR to explore whether changes are needed to the program. The methods that will be considered are similar to methods used by CMS for the same concerns.

As mentioned throughout this document, the impact of COVID-19 is still a factor for our quality programs. As COVID-19 prevalence declines and/or becomes endemic, the Maryland quality programs will need to include these patients in assessments of quality. Staff believes that the analytic plan using concurrent norms may allow us to include COVID-19 discharges. However, in future years when we have a base period that is after the most acute phases of the pandemic, staff will want to use that data to set performance standards so that we can not be making retrospective changes to the program.

Finally, staff notes that patient race and ethnicity, social determinants of health, socioeconomic status, and neighborhood factors need to be considered, as hospitals and the State of Maryland work to address disparities in health outcomes. Staff plans to analyze the complication measures data to understand disparities on these measures and other quality outcomes. During the upcoming year staff plans to convene a subgroup that assesses areas of focus for the Commission's equity work.

Stakeholder Feedback and Responses

As noted above in the Assessment section, staff raised concerns about the increasing rates of monitored PPCs in the PMWG meetings in October and November of this year. To facilitate stakeholder input on monitored PPCs for potential re-inclusion, staff presented analysis of the PPCs using the criteria and factors for selecting the more narrowed, focused list of PPCs for pay-for-performance when the program was re-designed in CY 2018 for the RY 2021 MHAC policy. Staff also reminded stakeholders of the information to access the 3M PPC documentation including the assignment and exclusion logic. Staff requested that stakeholders provide input on the "Strongly Consider" and "Consider" groups of PPCs listed in the Assessment section. In the PMWG meetings, while hospital stakeholders were concerned about the increasing trends in monitored PPCs, they were also generally concerned about the addition of PPCs, particularly in light of the ongoing COVID-19 PHE and the associated large demands and toll on hospitals. Additionally, staff received one comment letter to the draft MHAC recommendations from the Maryland Hospital Association that raised similar concerns, noting that more time was needed to determine the drivers of the monitored PPC trends, whether they be a reduced focus on coding and documentation versus deficiencies in clinical care.

RESPONSE:

While staff remains concerned about the increasing trends in particular monitored PPCs that may be clinically preventable, staff agrees that the current and ongoing challenges for hospitals because of the ongoing COVID-19 PHE takes precedence over asking hospitals to focus on additional PPCs in the

payment program. Staff has therefore withdrawn its recommendation to add monitored PPCs to the MHAC program this year. However, as always the staff will provide data for the monitoring PPCs to hospitals for their use in quality monitoring.

To better understand root causes of the increases in some of the monitored PPCs, staff plan in the coming months to contact individual hospitals whose rates may be driving the statewide increases. Staff plans to discuss relevant documentation and coding as well as clinical/care delivery issues that may be contributing to the increases. Staff will continue to encourage hospitals/stakeholders to review and comment on the 3M PPC documentation, including the exclusion and assignment logic, and provide input through the structured monthly PMWG meetings on PPC updates for RY 2025 and beyond.

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 2024 final recommendation, in general, maintains the measures and methodology that were developed and approved for RY 2023.[6]

These are the final recommendations for the RY 2024 Maryland Hospital Acquired Conditions (MHAC) program:

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. Assess monitoring PPCs based on clinical recommendations, statistical characteristics, and recent trends to prioritize those for future consideration for updating the measures in the payment program.
    c. Engage hospitals on specific PPC increases to understand trends and discuss potential quality concerns
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 and 2022.
3. Continue to assess hospital performance on attainment only.

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[6] See the RY 2023 policy for detailed discussion of the MHAC redesign, rationale for decisions, and approved recommendations

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 retrospectively the RY 2024 MHAC pay-for-performance program methodology as needed due to COVID-19 Public Health Emergency and report any changes to Commissioners.

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:
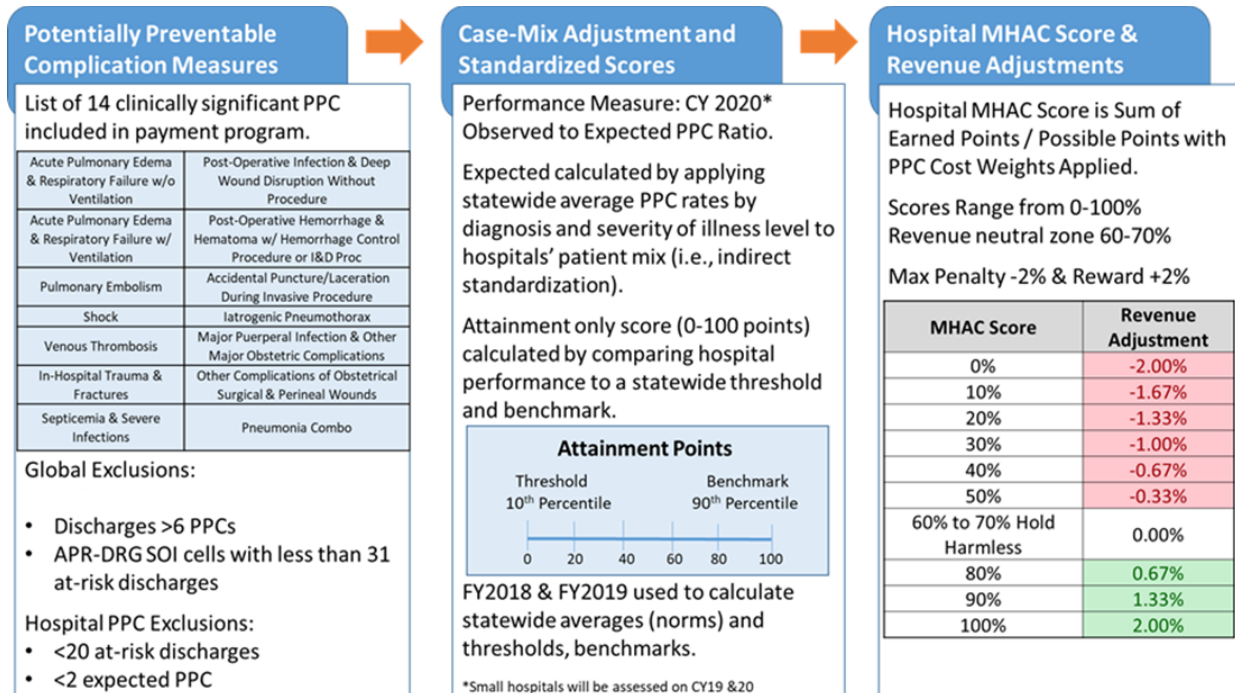https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/HospitalAcqCond/Downloads/FAQ-DRA-HAC-PSI.pdf

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 2023 MHAC Program Methodology

Figure 1 below provides a summary overview of the approved RY 2023 MHAC methodology.

Figure 1. Overview of RY 2023 Approved MHAC Methodology

Potentially Preventable Complication Measures	Case-Mix Adjustment and Standardized Scores	Hospital MHAC Score & Revenue Adjustments

Potentially Preventable Complication Measures

List of 14 clinically significant PPC included in payment program.

Acute Pulmonary Edema & Respiratory Failure w/o Ventilation	Post-Operative Infection & Deep Wound Disruption Without Procedure
Acute Pulmonary Edema & Respiratory Failure w/ Ventilation	Post-Operative Hemorrhage & Hematoma w/ Hemorrhage Control Procedure or I&D Proc
Pulmonary Embolism	Accidental Puncture/Laceration During Invasive Procedure
Shock	Iatrogenic Pneumothorax
Venous Thrombosis	Major Puerperal Infection & Other Major Obstetric Complications
In-Hospital Trauma & Fractures	Other Complications of Obstetrical Surgical & Perineal Wounds
Septicemia & Severe Infections	Pneumonia Combo

Global Exclusions:

- Discharges >6 PPCs
- APR-DRG SOI cells with less than 31 at-risk discharges

Hospital PPC Exclusions:
- <20 at-risk discharges
- <2 expected PPC

Case-Mix Adjustment and Standardized Scores

Performance Measure: CY 2020* Observed to Expected PPC Ratio.

Expected calculated by applying statewide average PPC rates by diagnosis and severity of illness level to hospitals' patient mix (i.e., indirect standardization).

Attainment only score (0-100 points) calculated by comparing hospital performance to a statewide threshold and benchmark.

Attainment Points

Threshold				Benchmark
10th Percentile				90th Percentile

0   20   40   60   80   100

FY2018 & FY2019 used to calculate statewide averages (norms) and thresholds, benchmarks.

*Small hospitals will be assessed on CY19 &20

Hospital MHAC Score & Revenue Adjustments

Hospital MHAC Score is Sum of Earned Points / Possible Points with PPC Cost Weights Applied.

Scores Range from 0-100% Revenue neutral zone 60-70%

Max Penalty -2% & Reward +2%

MHAC Score	Revenue Adjustment
0%	-2.00%
10%	-1.67%
20%	-1.33%
30%	-1.00%
40%	-0.67%
50%	-0.33%
60% to 70% Hold Harmless	0.00%
80%	0.67%
90%	1.33%
100%	2.00%

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

Acute care hospitals that do not have sufficient volume to have at least 20 at-risk and 2 expected for any payment program PPC are excluded from the MHAC policy.

Benchmarks and Thresholds

For each PPC, a threshold and benchmark value are calculated using the determined base period data. In previous rate years when improvement was 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.

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.

RY 2023 Update: Small Hospital Methodology

Hospital-specific PPC inclusion requirements were maintained in the RY 2023 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). "

Because of the COVID PHE, the above proposal was not implemented for RY 2022 but instead, the MHAC scores and revenue adjustments for RY 2021 were repeated in RY 2022.

For RY 2023, staff proposed 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.   Thus, in the RY 2023 recommendations, staff proposed 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 example, if the Commission decides to use July to December 2020 data, then small hospitals could be assessed on data from July 2020 through December 2020 and January to December 2021

Appendix III: Monitoring PPCs

The table below shows the monitored PPCs O/E ratios for CY 21 YTD (through June) and the changes in the ratio from CY 2018. The PPCs highlighted in green represent those PPCs that staff believes should be "strongly considered," and those highlighted in yellow are those that should be "considered." In addition, the following statistical information is provided:

- The CY 2021 and 2019 rates per thousand
- The observed counts for CYs 2019 and 2020 combined
- The 3M cost weights: these are based upon cost variation correlated with individual PPCs. The cost measurement provides an estimate of the incremental cost of the average PPC over the cost of the typical case at admission. Cost estimates are converted into relative weights on a similar scale to those of other admissions to provide context.
- Reliability and validity statistics for CY 18-19
- Variations among hospitals' O/E ratios with percent of hospitals below 0.85 or above 1.15 O/E
- Number of hospitals in the state eligible for the PPC (20 or more cases at risk for the PPCs and 2 or more expected PPCs) for those staff is recommending be strongly considered or considered.

	PPC Description	O/E Ratio 2021	21/18 % change	21 rate per 1000 (obs/atrisk *1000)	19 rate per 1000 (obs/atrisk *1000)	obs counts 19&20	3M cost weights	Reliability CY 18-19	Spearman's Predictive Validity CY18-19	Pearson's Predictive Validity CY18-19	Hospital Variation CY 18-19 O/E	Qualify-ing Hospitals CY18-19
31	Decubitis Ulcer	2.072532252	177.75%	1.1979359	0.65542465	159	2.732754	Strong	Very Weak	Very Weak	82.61	46
51	Gastrointestinal Ostomy Complications	1.718597992	143.68%	0.7390512	0.430243656	363	1.536037	Moderate	Weak	Moderate	80	40
47	Encephalopathy	1.564997708	95.30%	1.0876954	0.711396182	428	0.73486	Strong	Moderate	Moderate	86.62	39
26	Diabetic Ketoacidosis & Coma	1.241225227	90.48%	0.1579474	0.144046556	71	0.529726	Low	N/A	N/A	94.74	19
50	Mechanical Complication of Device, Implant & Graft	1.469228381	83.29%	1.0828006	0.859003256	669	1.16229	Strong	Weak	Moderate	72.5	40
45	Post Procedure Foreign Body	1.590764476	68.36%	0.0290641	0.019134827	22	0.599007	Very Low	Very Weak	Very Weak	95.65	46
15	Peripheral Vascular Complications except Venous Thrombosis	1.536704471	104.91%	0.5493201	0.377287304	261	1.509014	Moderate	Very Weak	Weak	68.97	29
23	GU Complications Except UTI	1.413699187	85.21%	0.4168621	0.329810917	241	0.59266	Low	Weak	Very Weak	81.82	33
34	Moderate Infectious	1.592439017	77.22%	1.3389441	0.813836638	233	1.319832	Strong	Strong	Very Strong	78.79	33
18	Major Gastrointestinal Complications with Transfusion or Significant Bleeding	1.359434475	70.32%	0.6059707	0.450138595	340	1.532197	Moderate	Weak	Moderate	78.95	38
13	Other Cardiac Complications	1.175128606	51.50%	0.3970074	0.36516392	252	0.370811	Strong	Moderate	Moderate	88.57	35
17	Major Gastrointestinal Complications without Transfusion or Significant Bleeding	1.255369369	48.50%	0.6737902	0.547433419	397	1.243755	Strong	Weak	Weak	89.74	39
29	Poisonings except from Anesthesia	1.144385284	48.25%	0.1542033	0.156751835	88	0.135078	Moderate	Very Strong	Very Strong		
52	Inflammation & Other Complications of Devices,Implants or Gr	1.084425214	36.36%	1.2117467	1.177818333	836	1.114926	Strong	Moderate	Moderate		
20	Other Gastrointestinal Complications without Transfusion or Si	1.294820046	34.31%	1.1186044	0.801833667	641	1.084788	Moderate	Very Weak	Very Weak		
40	Post-Operative Hemorrhage & Hematoma withoutHemorrhage	1.120816644	27.35%	4.8969488	4.477363636	1150	0.726008	Strong	Very Weak	Very Weak		
66	Catheter-Related Urinary Tract Infection	1.593794825	25.92%	0.1702901	0.046158462	9	0.800112	Strong	N/A	N/A		
1	Stroke & Intracranial Hemorrhage	1.118901984	24.41%	1.4162018	1.1961753	919	0.903899	Moderate	Weak	Weak		
19	Major Liver Complications	1.136822422	23.16%	0.6633808	0.515488787	413	0.726922	Strong	Very Weak	Weak		
27	Post-Hemorrhagic & Other Acute Anemia withTransfusion	1.05087275	11.70%	1.0401768	0.896475793	518	0.976265	Strong	Moderate	Moderate		
10	Congestive Heart Failure	0.96501292	11.70%	0.1710669	0.185425552	94	0.421532	Strong	N/A	N/A		
8	Other Pulmonary Complications	0.837757869	7.52%	0.6607423	0.904226378	373	0.844686	Strong	Moderate	Moderate		
25	Renal Failure with Dialysis	1.025418548	7.31%	0.2468878	0.215890282	107	2.904097	Moderate	N/A	N/A		
39	Reopening Surgical Site	1.055902787	6.91%	2.8355142	2.207216287	446	1.678212	Moderate	Weak	Weak		
11	Acute Myocardial Infarction	0.932359935	5.26%	1.1045771	1.180943012	840	0.407992	Strong	Moderate	Moderate		
33	Cellulitis	0.890671509	-4.43%	0.6884197	0.749318391	465	0.912768	Strong	Moderate	Moderate		
21	Clostridium Difficile Colitis	0.856196362	-14.80%	4.7207173	5.333759647	667	1.3374	Strong	Moderate	Weak		
65	Urinary Tract Infection without Catheter	0.919584705	-15.57%	4.0051524	3.515917693	2406	0.677804	Strong	Moderate	Moderate		
6	Aspiration Pneumonia	0.832606481	-20.70%	0.9345935	0.942210085	617	0.926432	Strong	Moderate	Moderate		
2	Extreme CNS Complications	0.513988392	-44.27%	0.3701015	0.660879402	411	0.463291	Strong	Moderate	Strong		
5	Pneumonia & Other Lung Infections	0.624438177	-45.88%	1.3265499	1.683720491	534	1.296954	Strong	Very Weak	Very Weak		
63	Postoperative Respiratory Failure with Tracheostomy	0	-100.00%	0	31.25	4	7.572636	#N/A	#N/A	#N/A		
38	Post-Operative Wound Infection & Deep WoundDisruption with	1.236654438	140.38%	0.4604052	0.529836413	11	2.464263	Very Low	#N/A	#N/A	100	3
59	Medical & Anesthesia Obstetric Complications	1.550394274	122.98%	3.7068818	3.022534498	400	0.125938	Strong	Very Weak	Very Weak	87.1	31
44	Other Surgical Complication - Mod	1.882049283	102.00%	0.8025682	0.38502916	104	1.08229	Low	N/A	N/A	90	20
54	Infections due to Central Venous Catheters	1.708700704	84.83%	0.2510166	0.142946606	44	2.964553	Moderate	N/A	N/A	90	10
53	Infection, Inflammation & Clotting Complicationsof Peripheral \	1.582724561	84.35%	0.2333961	0.155606161	105	0.52856	Strong	N/A	N/A	80.77	26
64	Other In-Hospital Adverse Events	1.284914723	80.18%	0.4154651	0.390416411	296	0	Strong	Very Weak	Very Weak	86.84	38
48	Other Complications of Medical Care	1.190529596	59.08%	0.4286806	0.408025869	285	1.074701	Moderate	Very Weak	Very Weak	86.11	36