Technical Notes

Hospital Quality-Based Program:

Potentially Preventable Complications

Patient Population: Texas Medicaid and CHIP

Reporting Period: State Fiscal Year 2017

The Institute for Child Health Policy

University of Florida

The External Quality Review Organization

for Texas Medicaid Managed Care and CHIP

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Table of Contents

Section 1. Introduction

Potentially Preventable Complications (PPCs) are in-hospital complications that are not present on admission, but result from treatment during the inpatient stay. As indicators of quality of care, PPCs represent harmful events or negative outcomes that might result from processes of care and treatment rather than from natural progression of the underlying disease. Increased costs resulting from complications are passed on to payers because the diagnosis codes linked to complications frequently increase Diagnosis Related Group (DRG) payment.

The 3M PPC methodology identifies PPCs based on risk at admission, using information from inpatient encounters, such as diagnoses codes, procedure codes, procedure dates, present on admission (POA) indicators, patient age, sex and discharge status. Accurate coding of the POA indicators is particularly important as it serves two primary purposes: (1) to identify potentially preventable complications from among diagnoses not present on admission, and (2) to allow only those diagnoses designated as present on admission to be used for assessing the risk of incurring complications.

Using the 3M approach, PPCs are also measured in other quality initiatives in Texas, namely the Delivery System Reform Incentive Payment (DSRIP program, website: https://hhs.texas.gov/laws-regulations/policies-rules/waivers/medicaid-1115-waiver) and in the future, the Department of State Health Services (DSHS) hospital quality reporting process (website: https://www.dshs.state.tx.us/thcic/default.shtm).

Section 2. Data

Inpatient facility admissions for all Medicaid programs and CHIP (MCO encounters and FFS claims) with an admission date for state fiscal year 2017 (September 1, 2016 through August 31, 2017), with three exceptions:

- *Medicaid / Medicare Dual Eligibility* – Admissions for enrollees who were dually eligible for both Medicaid and Medicare during the analysis year were excluded.

- *Hospitals with Less than 30 Admissions* – Admissions from hospitals with less than 30 total admissions were excluded because the POA quality check results are not deemed reliable when the claims volume is low.

- *3M defined PPC Exclusions* — A defined subset of diagnosis codes and procedure codes are eligible for consideration for PPCs. The 65 categories of PPCs are defined based on diagnoses and POA, procedures and procedure dates, and enrollee age. A PPC diagnosis may be preventable for some type of patients, but not for others and some complication groups apply to only certain types of patients, e.g. Obstetric complications occur in only females who deliver after an admission. Admissions for patients with certain severe or catastrophic conditions that are particularly susceptible to a range of complications, including those with trauma, HIV, and major or metastatic malignancies are also excluded. The 3M manual offers a detailed list of software exclusions.

Section 3. Present on Admission (POA) Quality Checks

POA code list:

- Y= Diagnosis was present at time of inpatient admission.
- N= Diagnosis was not present at time of inpatient admission.
- U= Documentation insufficient to determine if the condition was present at the time of inpatient admission.
- W= Clinically undetermined. Provider unable to clinically determine whether the condition was present at the time of inpatient admission.
- 1= Unreported/Not used. Exempt from POA reporting. This code is equivalent to a blank on the UB-04, however; it was determined that blanks are undesirable when submitting this data via the 4010A.

POA indicators are crucial for the identification of PPCs, however, the quality and consistency of this indicator varies greatly among hospitals. To help ensure calculation of the most accurate state average by which hospitals are compared, admission data from hospitals that do not pass the 3M thresholds for POA are not considered in calculating state averages (also called norms).

POA indicator value "U" (no information in the record) is mapped to "N" (not present on admission), and value "W" (clinically undetermined) is mapped to "Y" (present on admission).

The POA quality screening criteria was developed by 3M based on statistical criteria and clinical consensus. Two levels of POA quality were defined for each criterion, the "red zone" and the "grey zone". Hospitals failing in the "red zone" for ONE or more criterion, or in the "grey zone" for TWO or more criteria would fail a POA quality check and because of the failure are identified as having potentially having questionable data . Admission data for these hospitals are not used to calculate statewide norm but these hospitals are still evaluated for their PPC performance based on A/E ratio.

The POA quality screening criteria applied are:

Quality Screen 1: High % Non POA for secondary diagnoses on the Pre-Existing List

This criterion identifies hospitals with a high percent non-POA (POA = N) for pre-existing secondary diagnosis codes (excluding exempt codes).
- Red Zone: % Non POA on Pre-Exist ≥ 7.5%
- Grey Zone: 5% ≤ % Non POA on Pre-Exist < 7.5%

To calculate the percentage of non-POA for pre-existing secondary diagnoses, first identify pre-existing secondary diagnoses using the pre-existing diagnosis code list prepared by 3M. Note that some pre-existing diagnoses are applicable to neonates only. These neonate-specific pre-existing codes were flagged in the list, and they are counted only when the Major Diagnostic Category (MDC) code for the inpatient stay was 15. Then exclude the exempt diagnosis codes from the pre-existing diagnoses using

the exempt diagnosis code list prepared by CMS. The pre-existing code list is available as separate documents. The list of exempt secondary diagnosis codes is available in at
http://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/HospitalAcqCond/Coding.html.

The denominator of this quality screen is the total number of POA indicators for the pre-existing secondary diagnoses identified above. The numerator is number of POA indicators that were assigned "N" or "U" among the POAs that were identified as denominator.

Quality Screen 2: High % POA for secondary diagnoses

This criterion identifies hospitals with an extremely high percent present on admission (POA = Y) for secondary diagnosis codes (excluding exempt, pre-existing, and OB codes).
- Red Zone: % POA ≥ 96%
- Grey Zone: 93% ≤ % POA < 96%

The denominator of this quality screen is the total number of POA indicators for all the secondary diagnosis codes, excluding the pre-existing codes, exempt codes (see screen 1 above), and the OB codes. The numerator is the number of POA indicators that were assigned "Y" or "W" among the POAs that were identified as denominator.

Quality Screen 3: Low % POA for secondary diagnoses

This criterion identifies hospitals with an extremely low percent present on admission for secondary diagnoses codes (excluding exempt, pre-existing, and OB codes).
- Red Zone: % POA ≤ 70%
- Grey Zone: 70% < % POA ≤ 77%

The denominator and numerator of this quality screen is the same as screen 2 above.

Quality Screen 4: High % POA for secondary diagnoses on the Elective Surgical List

This criterion identifies hospitals with a high percent POA (POA = Y) for specified secondary diagnosis codes on elective surgery admissions.
- Red Zone: % POA ≥ 40%
- Grey Zone: 30% ≤ % POA < 40%

To calculate the percentage needed for this quality screen, first identify all the surgical admissions using the medical-surgical flag output by the 3M PPC grouper, and then identify the secondary diagnosis codes listed in the Appendix.

The denominator of this screen is the total number of POA indicators for all the secondary diagnosis codes in surgical admissions. The numerator is the number of elective surgery secondary diagnoses which have POA indicators that were assigned "Y" or "W" in these surgical admissions.

Section 4. PPC Logic and Calculations for Facilities

After exclusions outlined in Section 2, the PPC classification system first assigns each inpatient encounter to one of the All Patient-Refined Diagnosis-Related Groups (APR-DRGs). Each base APR-DRG has four levels of severity. Severity of illness (SOI) is defined as the extent of organ system derangement or physiologic decompensation for a patient. It gives a medical classification into 1=minor, 2=moderate, 3=major, and 4=extreme. Next, the exclusions for patients with severe or catastrophic conditions are identified. Finally, the remaining encounters are considered PPC candidate admissions and evaluated for PPCs. Multiple PPCs can be assigned to an admission if they are not clinically overlapping.

Because not all PPC categories require the same treatment resources, Healthcare Cost and Utilization Project (HCUP) Relative PPC weights generated by 3M are assigned to each PPC category. These weights were determined based on resource utilization from national medical data. High resource PPCs are weighted more heavily than PPCs requiring less resources. The total actual PPC weight for a hospital is the sum of the HCUP PPC weights associating with all the complications identified by the PPC grouper.

The PPCs are grouped into 65 categories. Admissions may be at risk for some PPC categories but not others. A state norm PPC rate for each admission APR-DRG/ Severity of Illness (SOI) level is calculated for each PPC category. Using PPC data from all hospitals passing the POA quality checks, the average PPC rate (total number of PPCs in each category divided by the total number of admissions at risk for that PPC category) in each admission APR-DRG and SOI is calculated to establish the Texas PPC norms for each PPC category. For each hospital, the expected PPC number is the sum of expected PPC numbers in the hospital for all levels of APR-DRG and SOI (Texas PPC norm for each APR-DRG/SOI times the admissions in the hospital at risk for that PPC category). The total expected PPC weights for each hospital is the sum of expected PPC weights for all the PPC categories (expected number of PPCs in each category times the PPC weight for that category).

The actual to expected ratio is the total actual PPC weights divided by the total expected PPC weights.

Regular facility bills do not have itemized expenditure for hospital-acquired complications, thus the PPC expenditures have to be estimated using the method suggested by 3M (Note: Expenditures are not included in the hospital level report or underlying data):

Hospital Expenditure = Total Actual HCUP PPC Weights X Scaling Factor X Hospital Base Rate

Total actual PPC weight was calculated as described above. The scaling factor was calculated by dividing the total Texas APR DRG weights (calculated by the Texas claims administrator (TMHP) using Texas inpatient data) associated with all the admissions by total National APR DRG weights (calculated by 3M using national data) associated with the same admissions. The scaling factor accounts for the relative difference between Texas and National relative resource utilization on inpatient cares. The hospital base rate is the total inpatient expenditure of a hospital divided by the total (Texas) APR DRG weights associating with the admissions of this hospital. Hospital base rate reflects the average expenditure per unit of relative weight of a given hospital. For the fiscal year 2017 reporting period, the Texas scaling factor is 1.344739.

Section 5. How Hospitals Should Use This Hospital Level Report

The "Hospital PPC Results by PPC Category" table in the report lists the top 40 PPC categories, ranked by the sum of PPC weights. Hospitals may focus on the top PPC categories to target opportunities for improvement. The underlying detail data will be provided to hospitals upon request. The underlying data is a good resource for hospitals to identity which claims/encounters have potentially preventable complications. Based on the information provided, hospitals can design their own intervention strategies.

The underlying data used to generate the hospital level report can be requested via an email to MCD_PPR_PPC@hhsc.state.tx.us (please provide full name, email, phone number, NPI, TPI and hospital name).

Section 6. Guide to the PPC Hospital Level Report

Using the 3M™ Core Grouping software and methodology (3M Core Grouping Software Version 2018.1.0; PPC Version 35.0), encounter and eligibility data for Texas Medicaid for fiscal year 2017 were used to calculate facility rates for PPCs.

Low volume hospitals can affect the reliability and interpretability of hospital-based summary statistics. Hospitals meeting the following criteria below were considered low volume. These hospitals will receive a report, but will be excluded from reimbursement reductions.

- Less than 40 total admissions at risk for PPC (at risk for any PPC category) or
- Less than 5 admissions that had any PPC.

Hospital
The hospital name associated with the NPI.

National Provider Identifier (NPI)
The NPI associated with the hospital, and identified as the billing hospital in the encounters attributed to the hospital and included in the provider results.

Texas Provider Identifier (TPI)
The TPIs corresponding to the hospital NPI based on the crosswalk provided by Texas Medicaid Healthcare Partnership (TMHP).

Table 1: Hospital Present on Admission (POA) Quality Check

See section 3 for full descriptions of each criterion and determination of the overall POA Quality Check.

- % columns show the percent of secondary diagnosis for eligible encounters fitting the criteria. Quality Screen 2 and 3 are combined to show very high or very low prevalence of the POA marker which is indicative of questionable data.
- POA Quality Check shows Red (Zone), Grey (Zone) or N/A for each of the four screens.
- POA Quality Check shows overall PASSED/FAILED based on rules described in section 3.

Table 2: Hospital PPC Resource Utilization

Total Number of Admissions
After exclusions, all institutional inpatient encounters with Type of Bill code = '11x', '12x', '41x', which represent hospital inpatient encounters. The report is not generated for hospitals with less than 30 total admissions, and these hospitals are also excluded from the calculation of state norm. The total number of admissions can be found in the underlying data by looking at the total amount of records.

Admissions at Risk for PPC
Admissions that are at risk for at least one PPC category, as defined by 3M PPC methodology. The admissions at risk for PPC can be found in the underlying data by filtering the 'Candidate Admissions' column = 1 (yes).

Number of PPC Admissions
The number of institutional inpatient admissions that had at least one PPC. The number of PPC admissions can be found in the underlying data by filtering the 'PPC Admission' column = 1 (yes).

Actual PPC Weights
The sum of HCUP PPC weights for all PPCs. Weights reflects the standardized resource utilization values estimated for the PPCs. Please see Appendix for the list of PPC weights.

Expected PPC Weights
The sum of expected PPC weights for the hospital, explained in Section 4.

Actual to Expected Ratio
The ratio of the actual PPC weights to the expected PPC weights. This is calculated by dividing the Actual PPC Weights by the Expected PPC Weights.

Total Reimbursement Reduction
The total reduction percentage of fee-for-service claims that HHSC will reduce based on the performance of PPCs, consistent with state legislation.

Hospitals will be penalized up to 2% for a PPC actual to expected ratio of 1.10 or greater (10% above the statewide risk adjusted average) or 2.5% for a PPC actual to expected ratio of greater than 1.25 (25% above the statewide, risk adjusted average).

Table 3: Hospital PPC Counts

Members with PPCs
The number of unique members with at least one PPC. The unique members with PPCs can be found in the underlying data by filtering the 'PPC Admission' column = 1 (yes) and de-duplicate the 'Medicaid Client ID' column to identify the unique members with PPCs.

Actual PPC Counts
The total number of PPCs. A single admission can have more than one PPC, therefore, this number is equal to or greater than the actual number of admissions that had a PPC. The actual PPC counts can be found in the underlying data by summing 'PPC 1' through 'PPC 66'.

Table 4: State-wide Hospital PPC Resource Utilization (information can be found in the State Norm file on the HHSC PPE webpage, see References)

Percentiles
Calculated from 'Actual PPC Weights' for all hospitals, excluding low volume hospitals and hospitals failing the POA Quality Check. Weights of a PPC are constructed such that combinations of individual PPC weights are additive. Low values indicate better performance.

Table 5: State-wide Hospital Distributions (information can be found in the State Norm file on the HHSC PPE webpage, see References)

Percentiles
Calculated from 'Total Number of Admissions', 'Admissions at Risk for PPC', 'Number of PPC Admissions', 'Members with PPCs', and 'Actual PPC Counts' for all hospitals, excluding low volume hospitals and hospitals failing the POA Quality Check.

Table 6: Hospital PPC Results by PPC Group

PPCs are assigned in 65 categories which are further classified into 8 mutually exclusive PPC groups based on clinical characteristics.

The table consists of five columns:

1) PPC Group – See Appendix: The "List of PPC groups" table shows the description of the PPC groups, and the "List of PPC categories" table shows which group a particular PPC category belongs to.

2) PPC Weights – Actual PPC weights for the PPCs belonging to the group. Refer to the calculation procedure in next section (Hospital PPC results by PPC Category). PPC weights for each group is the sum of the weights from all PPC categories that belong to the group.

3) Fraction of Total PPC Weights – The actual PPC weights for this group divided by the hospital's total actual PPC weights.

4) PPC Counts – The number of PPCs belong to the group. Refer to the calculation procedure in next section (Hospital PPC results by PPC Category). PPC counts for each group is the total number of PPCs from all PPC categories that belong to the group.

5) Fraction of Total PPCs – The PPC counts for this group divided by the hospital's total PPC counts.

Table 7: Hospital PPC Results by PPC Category (Top 40 PPC Categories by PPC Weights)

Based on the clinical reason, 3M PPC methodology generates 65 PPC categories. The top 40 categories that carried most weights were listed in the table. Since each PPC category was associated with different weight, the categories with the most frequent occurrence may not necessarily have the highest total

weights, thus the rank order of PPC weights is not aligned with the order of PPC counts. See Appendix for the detailed list of categories and their corresponding weights.

The table consists of five columns:

1) PPC Category – See Appendix: The "List of PPC categories" table shows the descriptions of the 65 PPC categories as well as the HCUP PPC weights associating with each category.

2) PPC Weights – Actual PPC weights for the given PPC category. Look up the corresponding PPC weights for the category in the Appendix and multiply the weight with PPC counts calculated below to obtain the number in this column. (For the fiscal year 2017 reporting period, you will also need to multiply by the Texas scaling factor which is 1.344739.) Note: Due to the rounding of the weights in the Appendix, the calculations will be off by a few digits.

3) Fraction of Total PPC Weights – The actual PPC weights for this category divided by the hospital's total actual PPC weights.

4) PPC Counts – The number of PPCs in this category. For each PPC category, filter the corresponding category number (PPC1 - PPC66) in the underlying data to show only PPCx = 1, the number of "1"s in the category column is the "PPC counts" of the category.

5) Fraction of Total PPCs – The PPC counts for this category divided by the hospital's total PPC counts.

Section 7. Underlying Admissions Data

The underlying inpatient admissions data are supplemented with the report cards for the providers to reproduce the PPC results. The data sets contain patients' Medicaid client IDs, claim IDs, all the diagnosis codes and their corresponding POA indicators, admit APR-DRG and SOI, PPC1-PPC66 indicators.

The Medicaid client ID and claim ID allow providers to match the admission data with their own database to obtain additional information. The diagnosis codes, POA indicators, combining with the pre-existing and exempt code lists, will be sufficient for the providers to reproduce the POA quality screening results following the methodologies in section 3. The PPC1-PPC66 indicators allow the providers to reproduce the PPC results. Each indicator corresponds to a PPC category. It may have the values 0, 1, or missing. When the value of a PPC indicator is missing, it means this admission was not at risk of this particular PPC category. Value 0 means the admission was at risk, yet this PPC did not occurred; and value 1 means this PPC occurred during the admission. Total PPC counts for certain category is the sum of the "1"s for the corresponding PPC indicator column. PPC counts were multiplied by the corresponding PPC weights (see Appendix) to calculate the total PPC weights of a PPC category. Same logic applies to the calculation of total actual PPC weights of a provider. Risk adjustment for each PPC category should only be applied to the admissions at risk of the category.

References

3M^{TM} Potentially Preventable Complications (PPCs) v35.0: Definitions Manual.

3M^{TM} Definitions Manuals via www.aprdrgassign.com (Username: TXHosp; Password: aprdrg004)

HHS PPE Webpage: http://hhs.texas.gov/about-hhs/process-improvement/medicaid-chip-quality-efficiency-improvement/potentially-preventable-events

Contact email for questions: MCD_PPR_PPC@hhsc.state.tx.us

Appendix

List of PPC groups

PPC Group	Group Description
1	Extreme Complications
2	Cardiovascular-Respiratory Complications
3	Gastrointestinal Complications
4	Perioperative Complications
5	Infectious Complications
6	Malfunctions, Reactions, etc.
7	Obstetrical Complications
8	Other Medical and Surgical Complications

List of PPC categories

PPC Category [b]	PPC Description	PPC Group	HCUP PPC Weight V33[a]
1	Stroke & Intracranial Hemorrhage	2	1.1453
2	Extreme CNS Complications	1	1.5464
3	Acute Pulmonary Edema and Respiratory Failure without Ventilation	2	0.7958
4	Acute Pulmonary Edema and Respiratory Failure with Ventilation	1	2.7409
5	Pneumonia & Other Lung Infections	2	1.3451
6	Aspiration Pneumonia	2	1.2553
7	Pulmonary Embolism	2	1.3671
8	Other Pulmonary Complications	2	0.9017
9	Shock	1	1.5133
10	Congestive Heart Failure	2	0.4572
11	Acute Myocardial Infarction	2	0.7034
13	Other Cardiac Complications	2	0.4655
14	Ventricular Fibrillation/Cardiac Arrest	1	1.2542
15	Peripheral Vascular Complications except Venous Thrombosis	2	1.2836
16	Venous Thrombosis	2	1.4346
17	Major Gastrointestinal Complications without Transfusion or Significant Bleeding	3	0.9346
18	Major Gastrointestinal Complications with Transfusion or Significant Bleeding	3	1.8077
19	Major Liver Complications	3	1.0202
20	Other Gastrointestinal Complications without Transfusion or Significant Bleeding	3	1.4927
21	Clostridium Difficile Colitis	5	1.7172

PPC Category [b]	PPC Description	PPC Group	HCUP PPC Weight V33[a]
22	*This category intentionally excluded. Category 22 was retired and Categories 65 and 66 were added.*	x	x
23	Genitourinary Complications Except Urinary Tract Infection	8	0.6246
24	Renal Failure without Dialysis	8	0.6028
25	Renal Failure with Dialysis	1	3.0876
26	Diabetic Ketoacidosis & Coma	8	0.8608
27	Post-Hemorrhagic & Other Acute Anemia with Transfusion	8	0.8812
28	In-Hospital Trauma and Fractures	8	0.3353
29	Poisonings except from Anesthesia	6	0.1812
30	Poisonings due to Anesthesia	6	0.0737
31	Pressure Ulcer	8	2.3048
32	Transfusion Incompatibility Reaction	6	1.2115
33	Cellulitis	5	0.8276
34	Moderate Infections	5	1.5978
35	Septicemia & Severe Infections	5	1.3722
36	Acute Mental Health Changes	8	0.3581
37	Post-Procedural Infection & Deep Wound Disruption Without Procedure	4	1.2701
38	Post-Procedural Wound Infection & Deep Wound Disruption with Procedure	4	2.4575
39	Reopening Surgical Site	4	1.4422
40	Peri-Operative Hemorrhage & Hematoma without Hemorrhage Control Procedure or I&D Procedure	4	0.5881
41	Peri-Operative Hemorrhage & Hematoma with Hemorrhage Control Procedure or I&D Procedure	4	1.0951
42[c]	Accidental Puncture/Laceration during Invasive Procedure	4	0.4466
44	Other Surgical Complication - Moderate	8	1.2153
45	Post-procedure Foreign Bodies	4	0.4933
46	Post-Procedural Substance Reaction & Non-O.R. Procedure for Foreign Body	4	0.6336
47	Encephalopathy	8	0.9697
48	Other Complications of Medical Care	8	1.6033
49	Iatrogenic Pneumothrax	6	0.6090
50	Mechanical Complication of Device, Implant & Graft	6	1.3081
51	Gastrointestinal Ostomy Complications	6	1.7224
52	Inflammation & Other Complications of Devices, Implants or Grafts except Vascular Infection	6	1.0618
53	Infection, Inflammation and Clotting Complications of Peripheral Vascular Catheters and Infusions	6	1.0573

PPC Category [b]	PPC Description	PPC Group	HCUP PPC Weight V33[a]
54	Infections due to Central Venous Catheters	6	2.5288
59	Medical & Anesthesia Obstetric Complications	7	0.1105
60	Major Puerperal Infection and Other Major Obstetric Complications	7	0.1729
61	Other Complications of Obstetrical Surgical & Perineal Wounds	7	0.1172
63	Post-Procedural Respiratory Failure with Tracheostomy	1	8.9614
64	Other In-Hospital Adverse Events	8	0.4031
65	Urinary Tract Infection	5	0.8008
66	Catheter-Related Urinary Tract Infection	5	0.9409

a. Corresponding PPC weights for Version 35 are not available, the most current weights provided by 3M are Version 33.
b. In PPC Version 35, 6 PPC categories (PPCs 12, 55, 56, 57, 58, 62) are suspended by 3M for further evaluation.
c. In ICD-10, PPC 43 has been eliminated and the accidental cuts during medical procedures will be captured in PPC 42.