PEDIATRIC QUALITY INDICATORS (PDI) PARAMETER ESTIMATES

ICD-10-CM Version 2019

Prepared for:
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Executive Summary

This document provides statistical parameters associated with Version 2019 of Agency for Healthcare Research and Quality (AHRQ) Quality Indicators™ (QI) Pediatric Quality Indicators (PDI). The parameter estimates derived for the AHRQ QI are based on analysis of the 2016 Agency for Healthcare Research and Quality's Healthcare Cost and Utilization Project (HCUP) State Inpatient Databases (SID).[1]

HCUP is a family of healthcare databases and related software tools and products developed through a Federal-State-Industry partnership.[2] HCUP includes the largest collection of longitudinal hospital care data in the United States, with all-payer, encounter-level information beginning in 1988. The SID contain all-payer, encounter-level information on inpatient discharges, including clinical and resource information typically found on a billing record, such as patient demographics, up to 30 *International Classification of Diseases, Tenth Revision, Clinical Modification/Procedural Classification System (ICD-10-CM/PCS)* diagnoses and procedures, length of stay (LOS), expected payer, admission and discharge dates and discharge disposition. In 2016, the HCUP databases represent more than 97 percent of all annual discharges in the U.S.[3]

The analytic dataset used to generate the risk adjustment regression models in this document consists of the same hospital discharge records that comprise the reference population for Version 2019 of the AHRQ QI software. This reference population file was limited to community hospitals and excludes rehabilitation and long-term acute care (LTAC) hospitals. Information on the type of hospital was obtained by the American Hospital Association (AHA) Annual Survey of Hospitals. AHA defines community hospitals as "all non-Federal, short-term, general, and other specialty hospitals, excluding hospital units of institutions." Included among community hospitals are specialty hospitals such as obstetrics-gynecology, ear-nose-throat, orthopedic, and pediatric institutions. Also included are public hospitals and academic medical centers.

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[1] Healthcare Cost and Utilization Project (HCUP) 2016 State Inpatient Databases (SID). Agency for Healthcare Research and Quality, Rockville, MD

[2] The AHRQ QI program would like to acknowledge the HCUP Partner organizations that participated in the HCUP SID: Alaska State Hospital and Nursing Home Association, Arizona Department of Health Services, Arkansas Department of Health, California Office of Statewide Health Planning and Development, Colorado Hospital Association, Connecticut Hospital Association, Delaware Division of Public Health, District of Columbia Hospital Association, Florida Agency for Health Care Administration, Georgia Hospital Association, Hawaii Health Information Corporation, Illinois Department of Public Health, Indiana Hospital Association, Iowa Hospital Association, Kansas Hospital Association, Kentucky Cabinet for Health and Family Services, Louisiana Department of Health and Hospitals, Maine Health Data Organization, Maryland Health Services Cost Review Commission, Massachusetts Division of Health Care Finance and Policy, Michigan Health & Hospital Association, Minnesota Hospital Association (provides data for Minnesota and North Dakota), Missouri Hospital Industry Data Institute, Montana MHA - An Association of Montana Health Care Providers, Nebraska Hospital Association, Nevada Department of Health and Human Services, New Jersey Department of Health, New Mexico Department of Health, New York State Department of Health, North Carolina Department of Health and Human Services, North Dakota (data provided by the Minnesota Hospital Association), Ohio Hospital Association, Oklahoma State Department of Health, Oregon Association of Hospitals and Health Systems, Oregon Office of Health Analytics, Pennsylvania Health Care Cost Containment Council, Rhode Island Department of Health, South Carolina Revenue and Fiscal Affairs Office, South Dakota Association of Healthcare Organizations, Tennessee Hospital Association, Texas Department of State Health Services, Utah Department of Health, Vermont Association of Hospitals and Health Systems, Virginia Health Information, Washington State Department of Health, West Virginia Health Care Authority, Wisconsin Department of Health Services, Wyoming Hospital Association.

[3] The states included in the analysis are Alaska, Arkansas, Arizona, California, Colorado, Connecticut, Delaware, District of Columbia, Florida, Georgia, Hawaii, Iowa, Illinois, Indiana, Kansas, Kentucky, Louisiana, Maryland, Maine, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, North Carolina, Nebraska, New Jersey, New Mexico, Nevada, New York, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Virginia, Vermont, Washington, Wisconsin, West Virginia, and Wyoming.

The 2016 HCUP SID includes information on all inpatient discharges from hospitals in participating States. Discharges from all 48 participating States are used to develop risk-adjustment models for the area-level PDIs. This document is devoted to listing covariates and coefficients for risk adjustment logistic regression models. The regression coefficients are used by the prediction module to calculate risk-adjusted rates that account for differences in patient populations across areas. Covariates that are considered as potential risk adjusters include gender and age and the interaction of gender and age. Descriptions of the population age categories are provided in the Table A.1. Every covariate in every model is a binary indicator variable, coded using 0 or 1. The AHRQ QI software user does not need to manipulate or adjust these coefficients; rather this document is intended to make it transparent to the user how the risk adjusted QI rates are calculated.

The document provides a risk adjustment coefficient table for each risk-adjusted PDI.[4] Certain indicators (such as PDI #11 Postoperative Wound Dehiscence Rate) are not risk-adjusted because materially important risk factors (e.g., post-operative coughing) are not available in the Healthcare Cost and Utilization Project (HCUP) State Inpatient Database (SID).

Several PDI have populations at risk that are complex, and are therefore stratified in a manner described in the technical specifications so analysts may examine observed rates for each stratum. Categorical variables are used to identify the strata. Whereas the risk adjustment models in some of the other AHRQ QI modules fit individual models for individual QI strata, which results in stratum-specific coefficients for each variable in the models, the PDI module includes at most one risk adjustment model per QI, pooling the data across strata to fit coefficients on the covariates, and using binary indicator covariates to fit a separate regression intercept for each stratum.

Additional information on the risk adjustment process and composite indicators may be found in *Quality Indicator Empirical Methods*, available on the AHRQ QI™ website. (http://www.qualityindicators.ahrq.gov/modules/Default.aspx)

[4] It is expected that risk-adjusted hospital PDIs will be available in 2020.

Table 1. Risk Adjustment Coefficients (non SES) for PDI 14 Asthma Admission Rate

PARAMETER	LABEL	DF	Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square
INTERCEPT	Intercept	1	-6.158460942	0.0088181	487746.3342	0
SEX	Female	1	-0.469611502	0.0144118	1061.797702	<.0001
AGE	Age 0-4	0	0	.	.	.
AGE	Age 5-9	1	-0.477771793	0.012289	1511.509147	0
AGE	Age 10-14	1	-1.374222399	0.0159845	7391.180486	0
AGE	Age 15-17	1	-2.196405629	0.0271015	6568.103442	0
AGE	Female,Age 0-4	0	0	.	.	.
AGE	Female,Age 5-9	1	0.067156788	0.0198787	11.41311469	0.000729275
AGE	Female,Age 10-14	1	0.183603906	0.0251378	53.34671712	0
AGE	Female,Age 15-17	1	0.69232732	0.0375997	339.042482	<.0001

c-statistic=0.603

Table 2. Risk Adjustment Coefficients (non SES) for PDI 15 Diabetes Short-Term Complications Admission Rate

PARAMETER	LABEL	DF	Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square
INTERCEPT	Intercept	1	-8.024548333	0.0217273	136404.9326	0
SEX	Female	1	0.271540116	0.029123	86.93516059	0
AGE	Age 5-9	1	-1.078090888	0.0393599	750.2457273	<.0001
AGE	Age 10-14	1	-0.20279428	0.0287735	49.67357252	0
AGE	Age 15-17	0	0	.	.	.
AGE	Female,Age 5-9	1	-0.050491	0.0531624	0.902032656	0.342237266
AGE	Female,Age 10-14	1	-0.133486708	0.0390766	11.66922587	0.000635424
AGE	Female,Age 15-17	0	0	.	.	.

c-statistic=0.555

Table 3. Risk Adjustment Coefficients (non SES) for PDI 16 Gastroenteritis Admission Rate

PARAMETER	LABEL	DF	Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square
INTERCEPT	Intercept	1	-6.988959945	0.0106018	434577.7966	0
SEX	Female	1	-0.187346099	0.0159439	138.0698039	<.0001
AGE	Age 0-4	0	0	.	.	.
AGE	Age 5-9	1	-1.343914865	0.0226101	3532.951116	0
AGE	Age 10-14	1	-1.955788785	0.0290061	4546.368787	0
AGE	Age 15-17	1	-1.991299237	0.0365998	2960.166483	0
AGE	Female,Age 0-4	0	0	.	.	.
AGE	Female,Age 5-9	1	0.099590534	0.0332755	8.95748221	0.00276335
AGE	Female,Age 10-14	1	0.144889904	0.0421385	11.82271705	0.000585124
AGE	Female,Age 15-17	1	0.475159713	0.0494273	92.41575814	0

c-statistic=0.641

Table 4. Risk Adjustment Coefficients (non SES) for PDI 18 Urinary Tract Infection Admission Rate

PARAMETER	LABEL	DF	Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square
INTERCEPT	Intercept	1	-8.643946689	0.0242343	127222.0226	0
SEX	Female	1	1.344349656	0.027344	2417.137471	0
AGE	Age 0-4	0	0	.	.	.
AGE	Age 5-9	1	-1.411573199	0.0530994	706.6890936	<.0001
AGE	Age 10-14	1	-1.551110912	0.0559636	768.199977	<.0001
AGE	Age 15-17	1	-1.558951721	0.068950135	511.2049936	<.0001
AGE	Female,Age 0-4	0	0	.	.	.
AGE	Female,Age 5-9	1	0.554506531	0.057696	92.36809583	0
AGE	Female,Age 10-14	1	-0.070566212	0.063515781	1.234327272	0.266567134
AGE	Female,Age 15-17	1	0.972959261	0.073101691	177.1472689	<.0001

c-statistic=0.688

Table 5. Risk Adjustment Coefficients (non SES) for PDI 90 Pediatric Quality Overall Composite

PARAMETER	LABEL	DF	Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square
INTERCEPT	Intercept	1	-7.228161692	0.0145964	245225.1163	0
SEX	Female	1	0.558235025	0.018455	914.9646195	<.0001
AGE	Age 5-9	1	0.790761485	0.0169773	2169.4829	0
AGE	Age 10-14	1	0.290859318	0.0176392	271.8998289	<.0001
AGE	Age 15-17	0	0	.	.	.
AGE	Female,Age 5-9	1	-0.669140968	0.0224357	889.5216406	<.0001
AGE	Female,Age 10-14	1	-0.561087905	0.0232631	581.7389743	<.0001
AGE	Female,Age 15-17	0	0	.	.	.

c-statistic=0.533

Table 6. Risk Adjustment Coefficients (non SES) for PDI 91 Pediatric Quality Acute Composite

PARAMETER	LABEL	DF	Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square
INTERCEPT	Intercept	1	-8.722057841	0.0307891	80249.97053	0
SEX	Female	1	1.205944516	0.0352815	1168.315384	<.0001
AGE	Age 5-9	1	0.48629535	0.037427	168.8224772	<.0001
AGE	Age 10-14	1	0.0292673	0.038918	0.565543005	0.452035463
AGE	Age 15-17	0	0	.	.	.
AGE	Female,Age 5-9	1	-0.625052297	0.0442943	199.1299121	<.0001
AGE	Female,Age 10-14	1	-0.77357496	0.0468473	272.6688119	<.0001
AGE	Female,Age 15-17	0	0	.	.	.

c-statistic=0.575

Table 7. Risk Adjustment Coefficients (non SES) for PDI 92 Pediatric Quality Chronic Composite

PARAMETER	LABEL	DF	Estimate	Standard Error	Wald Chi-Square	Pr > Chi-Square
INTERCEPT	Intercept	1	-7.482720292	0.0165749	203805.7628	0
SEX	Female	1	0.251455092	0.0223171	126.9534988	<.0001
AGE	Age 5-9	1	0.863801493	0.0191001	2045.293638	0
AGE	Age 10-14	1	0.35535452	0.019832	321.0648624	<.0001
AGE	Age 15-17	0	0	.	.	.
AGE	Female,Age 5-9	1	-0.583288563	0.0268145	473.1802162	<.0001
AGE	Female,Age 10-14	1	-0.37545907	0.0275041	186.3507128	<.0001
AGE	Female,Age 15-17	0	0	.	.	.

c-statistic=0.54

Table A.1. Population Age and Birth Weight Categories

AGE IN YEARS CATEGORIES (PAGECAT)	
5	13 to 17 years
4	6 to 12 years
3	3 to 5 years
2	1 to 2 years
1	< 1 year
AGE IN DAYS CATEGORIES (AGEDCAT)	
4	4
91+ days	91+ days
3	3
61 to 90 days	61 to 90 days
BIRTH WEIGHT CATEGORIES (BWHTCAT)	
9	2500+ grams
8	2000-2499 grams
7	1750-1999 grams

6	1500-1749 grams
5	1250-1499 grams
4	1000-1249 grams
3	750-999 grams
2	500-749 grams
1	<500 grams