



Emergency Department Prevention Quality Indicators (ED PQI) Parameter Estimates, v2023

Prepared for:

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Executive Summary

This document provides statistical parameters associated with Version 2023 Agency for Healthcare Research and Quality (AHRQ) Quality Indicators (QI) Emergency Department Prevention Quality Indicators (ED PQI¹). The parameter estimates derived for the AHRQ QI are based on analysis of the 2019 AHRQ Healthcare Cost and Utilization Project (HCUP) State Emergency Department Databases (SEDD) and State Inpatient Databases (SID).²

HCUP is a family of healthcare databases and related software tools and products developed through a Federal- State-Industry partnership. HCUP includes the largest collection of longitudinal hospital care data in the United States, with all-payer, encounter-level information beginning in 1988. The SEDD and SID contain all-payer, encounter-level information on emergency department visits and 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 2019, 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 2023 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.

The 2019 HCUP SEDD includes information on all emergency department visits not resulting in inpatient stays from hospital in participating states. The 2019 HCUP SID includes information on all inpatient stays from hospital in participating states, including stays beginning in the emergency department. Emergency department visits from 41 states participating in both the SEDD and SID are used to develop risk-adjustment models for the ED PQI. 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 sex and age and the interaction of sex and age. Descriptions of the population age categories are provided in Table 6. Every covariate in every

¹ When referencing the Emergency Department Prevention Quality Indicators, the abbreviation ED PQI is used for the module or set of indicators, while the abbreviation PQE is used for individual indicators.

² Healthcare Cost and Utilization Project (HCUP) 2019 State Emergency Department Databases (SEDD) and State Inpatient Databases (SID). Agency for Healthcare Research and Quality, Rockville, MD.

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

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.

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>)

Acknowledgments

The AHRQ QI program would like to acknowledge the HCUP Partner organizations that participated in the HCUP SID and SEDD: **Alaska** Department of Health, **Alaska** Hospital and Healthcare Association, **Arizona** Department of Health Services, **Arkansas** Department of Health, **California** Department of Health Care Access and Information, **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** Laulima Data Alliance, **Hawaii** University of Hawaii at Hilo, **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, **Maine** Health Data Organization, **Maryland** Health Services Cost Review Commission, **Massachusetts** Center for Health Information and Analysis, **Michigan** Health & Hospital Association, **Minnesota** Hospital Association, **Mississippi** State Department of Health, **Missouri** Hospital Industry Data Institute, **Montana** Hospital Association, **Nebraska** Hospital Association, **Nevada** Department of Health and Human Services, **New Hampshire** Department of Health & 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** Health Authority, **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** Department of Health and Human Resources, **Wisconsin** Department of Health Services, and **Wyoming** Hospital Association.

Parameter Estimates Tables

Table 1. Risk Adjustment Coefficients for PQE 01 – ED Visits for Non-Traumatic Dental Conditions

Parameter	Label	DF	Estimate	Standard Error	Wald Chi Square	Pr > Chi Square
INTERCEPT	Intercept	1	-7.074887770	0.0242033229	85445.4854959329	<.0001
SEX	Female	1	-0.2135762616	0.0315479173	45.8315530283	<.0001
AGECAT2	Age 5-9	1	0.8608251004	0.0253531955	1152.8277829895	<.0001
AGECAT3	Age 10-14	1	-0.0079393697	0.0267855571	0.0878558494	0.7669
AGECAT4	Age 15-17	1	0.3803772140	0.0271103378	196.8607473069	<.0001
AGECAT5	Age 18-24	1	1.7317948222	0.0245321745	4983.3430188275	<.0001
AGECAT6	Age 25-29	1	2.3486338158	0.0244337826	9239.5157078539	<.0001
AGECAT7	Age 30-34	1	2.3157774535	0.0244551309	8967.1340184379	<.0001
AGECAT8	Age 35-39	1	2.1088662216	0.0245252112	7393.8825638588	<.0001
AGECAT9	Age 40-44	1	1.8418891951	0.0246616992	5578.0320658366	<.0001
AGECAT10	Age 45-49	1	1.5614624092	0.0247965287	3965.3478549657	<.0001
AGECAT11	Age 50-54	1	1.3767186873	0.0249155373	3053.1623605351	<.0001
AGECAT12	Age 55-59	1	1.1245914557	0.0250710889	2012.0703713452	<.0001
AGECAT13	Age 60-64	1	0.7228589465	0.0255928960	797.7526541942	<.0001
AGECAT14	Age 65-69	1	0.3704471176	0.0265394737	194.8353817903	<.0001
AGECAT15	Age 70-74	1	0.0414982555	0.0281628947	2.1712263395	0.1406
AGECAT16	Age 75-79	1	-0.0724022291	0.0305768759	5.6068334397	0.0179
AGECAT17	Age 80-84	1	-0.0337181437	0.0335558632	1.0096956449	0.3150
FAGECAT2	Female, Age 5-9	1	0.0696343209	0.0334815965	4.3254806317	0.0375
FAGECAT3	Female, Age 10-14	1	0.2767084715	0.0354378594	60.9691232207	<.0001
FAGECAT4	Female, Age 15-17	1	0.4647274309	0.0355711051	170.6875715169	<.0001
FAGECAT5	Female, Age 18-24	1	0.4014415194	0.0320188022	157.1934379947	<.0001

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Parameter	Label	DF	Estimate	Standard Error	Wald Chi Square	Pr > Chi Square
FAGECAT6	Female, Age 25-29	1	0.3929508790	0.0318791828	151.9365180333	<.0001
FAGECAT7	Female, Age 30-34	1	0.3836678617	0.0319085526	144.5761429848	<.0001
FAGECAT8	Female, Age 35-39	1	0.3385840625	0.0320134768	111.8580739208	<.0001
FAGECAT9	Female, Age 40-44	1	0.3138875595	0.0322138836	94.9428000777	<.0001
FAGECAT10	Female, Age 45-49	1	0.3039002608	0.0324085597	87.9311361518	<.0001
FAGECAT11	Female, Age 50-54	1	0.2322493656	0.0326128511	50.7144286403	<.0001
FAGECAT12	Female, Age 55-59	1	0.1520355221	0.0328801064	21.3807882185	<.0001
FAGECAT13	Female, Age 60-64	1	0.1432599212	0.0336562569	18.1183142276	<.0001
FAGECAT14	Female, Age 65-69	1	0.1449456404	0.0350151335	17.1355773859	<.0001
FAGECAT15	Female, Age 70-74	1	0.2416641378	0.0371013099	42.4273520183	<.0001
FAGECAT16	Female, Age 75-79	1	0.1966439118	0.0403960103	23.6964921373	<.0001
FAGECAT17	Female, Age 80-84	1	0.1062343893	0.0444872180	5.7024272791	0.0169

c-statistic=0.71

Table 2. Risk Adjustment Coefficients for PQE 02 – ED Visits for Chronic Ambulatory Care Sensitive Conditions

Parameter	Label	DF	Estimate	Standard Error	Wald Chi Square	Pr > Chi Square
INTERCEPT	Intercept	1	-2.449170381	0.0026002900	887144.6575950040	<.0001
SEX	Female	1	-0.1544775963	0.0033342362	2146.5365080210	<.0001
AGECAT9	Age 40-44	1	-1.986650323	0.0041213308	232363.5014562590	<.0001
AGECAT10	Age 45-49	1	-1.778765615	0.0038689502	211373.8074305670	<.0001
AGECAT11	Age 50-54	1	-1.491248302	0.0036039883	171211.6022284240	<.0001
AGECAT12	Age 55-59	1	-1.253095825	0.0033879263	136804.5893169050	<.0001
AGECAT13	Age 60-64	1	-1.112849712	0.0033526974	110175.3225963160	<.0001
AGECAT14	Age 65-69	1	-1.007410698	0.0034133400	87107.1921628615	<.0001
AGECAT15	Age 70-74	1	-0.8396754133	0.0034681123	58618.7523640101	<.0001

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Parameter	Label	DF	Estimate	Standard Error	Wald Chi Square	Pr > Chi Square
AGECAT16	Age 75-79	1	-0.5440790115	0.0035773161	23131.7936123227	<.0001
AGECAT17	Age 80-84	1	-0.2947473597	0.0038120264	5978.4422409992	<.0001
FAGECAT9	Female, Age 40-44	1	0.2948930459	0.0054918754	2883.2858934486	<.0001
FAGECAT10	Female, Age 45-49	1	0.2717428798	0.0051462841	2788.2314743788	<.0001
FAGECAT11	Female, Age 50-54	1	0.2185609159	0.0047989449	2074.2136047636	<.0001
FAGECAT12	Female, Age 55-59	1	0.1373768192	0.0045139688	926.2107416458	<.0001
FAGECAT13	Female, Age 60-64	1	0.0894452772	0.0044697094	400.4573294415	<.0001
FAGECAT14	Female, Age 65-69	1	0.0508183825	0.0045577579	124.3194761405	<.0001
FAGECAT15	Female, Age 70-74	1	0.0935760645	0.0046032827	413.2322949550	<.0001
FAGECAT16	Female, Age 75-79	1	0.0660364210	0.0047378176	194.2720741837	<.0001
FAGECAT17	Female, Age 80-84	1	0.0520222586	0.0050163622	107.5475768455	<.0001

c-statistic=0.637

Table 3. Risk Adjustment Coefficients for PQE 03 – ED Visits for Acute Ambulatory Care Sensitive Conditions

Parameter	Label	DF	Estimate	Standard Error	Wald Chi Square	Pr > Chi Square
INTERCEPT	Intercept	1	-4.697422367	0.0036637981	1643827.2051789300	<.0001
SEX	Female	1	0.0979877225	0.0049639118	389.6684311843	<.0001
AGECAT1	Age 0-4	1	2.7166191977	0.0038187777	506067.8733010930	<.0001
AGECAT2	Age 5-9	1	1.7441625689	0.0039791363	192130.4922432520	<.0001
AGECAT3	Age 10-14	1	1.0664816268	0.0042204184	63855.1222145527	<.0001
AGECAT4	Age 15-17	1	0.7924602177	0.0047894813	27376.5032769183	<.0001
AGECAT5	Age 18-24	1	0.8886773898	0.0041230324	46457.3853676579	<.0001
AGECAT6	Age 25-29	1	0.8896858457	0.0042445353	43935.2456085227	<.0001
AGECAT7	Age 30-34	1	0.8658227944	0.0042891139	40749.5548130635	<.0001
AGECAT8	Age 35-39	1	0.7526668406	0.0043831557	29487.0799557515	<.0001

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Parameter	Label	DF	Estimate	Standard Error	Wald Chi Square	Pr > Chi Square
AGECAT9	Age 40-44	1	0.6095181872	0.0045512179	17935.6894440021	<.0001
AGECAT10	Age 45-49	1	0.4416771704	0.0046749838	8925.8521359599	<.0001
AGECAT11	Age 50-54	1	0.3387771090	0.0047708799	5042.3285355266	<.0001
AGECAT12	Age 55-59	1	0.1966352201	0.0048609695	1636.3523264472	<.0001
FAGECAT1	Female, Age 0-4	1	-0.2032818470	0.0052071096	1524.0659349484	<.0001
FAGECAT2	Female, Age 5-9	1	-0.0821483778	0.0054345755	228.4897534004	<.0001
FAGECAT3	Female, Age 10-14	1	0.0432713560	0.0057474614	56.6824849805	<.0001
FAGECAT4	Female, Age 15-17	1	0.2852643504	0.0064056502	1983.2093747630	<.0001
FAGECAT5	Female, Age 18-24	1	0.9155857279	0.0054477301	28246.6448697641	<.0001
FAGECAT6	Female, Age 25-29	1	0.7860684665	0.0055977983	19719.0625042336	<.0001
FAGECAT7	Female, Age 30-34	1	0.6699096327	0.0056654166	13981.9820444307	<.0001
FAGECAT8	Female, Age 35-39	1	0.2085040149	0.0058957608	1250.6884407871	<.0001
FAGECAT9	Female, Age 40-44	1	0.1569873203	0.0061296603	655.9282591105	<.0001
FAGECAT10	Female, Age 45-49	1	0.1360020899	0.0062962567	466.5802008788	<.0001
FAGECAT11	Female, Age 50-54	1	0.0844018899	0.0064476189	171.3584913942	<.0001
FAGECAT12	Female, Age 55-59	1	0.0348730752	0.0065832478	28.0608026730	<.0001

c-statistic=0.703

Table 4. Risk Adjustment Coefficients for PQE 04 – ED Visits for Asthma

Parameter	Label	DF	Estimate	Standard Error	Wald Chi Square	Pr > Chi Square
INTERCEPT	Intercept	1	-5.702512134	0.0057029741	999838.0113638180	<.0001
SEX	Female	1	0.5467797923	0.0071758955	5805.9420502065	<.0001
AGECAT2	Age 5-9	1	1.1047196655	0.0066352224	27719.9980673235	<.0001
AGECAT3	Age 10-14	1	0.5821152100	0.0071564907	6616.3377566879	<.0001
AGECAT4	Age 15-17	1	0.0351020024	0.0092827874	14.2990430693	0.0002

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Parameter	Label	DF	Estimate	Standard Error	Wald Chi Square	Pr > Chi Square
AGECAT5	Age 18-24	1	0.2268771210	0.0071274453	1013.2430055451	<.0001
AGECAT6	Age 25-29	1	0.1982876032	0.0075296122	693.4991087557	<.0001
AGECAT7	Age 30-34	1	0.1160057778	0.0077641748	223.2382610605	<.0001
FAGECAT2	Female, Age 5-9	1	-1.037298364	0.0090820591	13044.8393380326	<.0001
FAGECAT3	Female, Age 10-14	1	-0.8112441420	0.0097726807	6890.8965336396	<.0001
FAGECAT4	Female, Age 15-17	1	-0.3105133756	0.0122191492	645.7712257999	<.0001
FAGECAT5	Female, Age 18-24	1	-0.1937928523	0.0091233365	451.1989987895	<.0001
FAGECAT6	Female, Age 25-29	1	-0.1866164640	0.0096595930	373.2349046528	<.0001
FAGECAT7	Female, Age 30-34	1	-0.1097039864	0.0098849628	123.1671072961	<.0001

c-statistic=0.577

Table 5. Risk Adjustment Coefficients for PQE 05 – ED Visits for Back Pain

Parameter	Label	DF	Estimate	Standard Error	Wald Chi Square	Pr > Chi Square
INTERCEPT	Intercept	1	-7.457659849	0.0373044648	39965.3402262805	<.0001
SEX	Female	1	0.3489884039	0.0442278220	62.2631210459	<.0001
AGECAT5	Age 18-24	1	-0.7040945521	0.0429326239	268.9596339538	<.0001
AGECAT6	Age 25-29	1	0.0260018022	0.0408127781	0.4058958258	0.5241
AGECAT7	Age 30-34	1	0.3876878727	0.0399164889	94.3321569699	<.0001
AGECAT8	Age 35-39	1	0.5943654344	0.0395528216	225.8146685453	<.0001
AGECAT9	Age 40-44	1	0.6778021797	0.0395832127	293.2134184763	<.0001
AGECAT10	Age 45-49	1	0.6989404503	0.0395029286	313.0558061139	<.0001
AGECAT11	Age 50-54	1	0.7832092508	0.0393264461	396.6305984292	<.0001
AGECAT12	Age 55-59	1	0.7778751166	0.0392442520	392.8869897466	<.0001
AGECAT13	Age 60-64	1	0.5574581675	0.0399118034	195.0840942950	<.0001
AGECAT14	Age 65-69	1	0.3089476353	0.0412337469	56.1389323543	<.0001

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Parameter	Label	DF	Estimate	Standard Error	Wald Chi Square	Pr > Chi Square
AGECAT15	Age 70-74	1	0.0869796788	0.0432639755	4.0418738098	0.0444
AGECAT16	Age 75-79	1	0.0890463216	0.0459173964	3.7607759278	0.0525
AGECAT17	Age 80-84	1	0.1039736481	0.0502096990	4.2881634372	0.0384
FAGECAT5	Female, Age 18-24	1	0.1903171771	0.0517889440	13.5046042891	0.0002
FAGECAT6	Female, Age 25-29	1	-0.0418667445	0.0493983052	0.7183139258	0.3967
FAGECAT7	Female, Age 30-34	1	-0.0532137602	0.0480816900	1.2248656272	0.2684
FAGECAT8	Female, Age 35-39	1	-0.0527494839	0.0475171918	1.2323523483	0.2670
FAGECAT9	Female, Age 40-44	1	-0.0756436171	0.0475722403	2.5283510146	0.1118
FAGECAT10	Female, Age 45-49	1	-0.1048244700	0.0474789289	4.8744264700	0.0273
FAGECAT11	Female, Age 50-54	1	-0.2191157318	0.0473612990	21.4042447712	<.0001
FAGECAT12	Female, Age 55-59	1	-0.3455554435	0.0473758205	53.2012687044	<.0001
FAGECAT13	Female, Age 60-64	1	-0.3221301382	0.0483447286	44.3981081124	<.0001
FAGECAT14	Female, Age 65-69	1	-0.2511329039	0.0501114479	25.1150087905	<.0001
FAGECAT15	Female, Age 70-74	1	-0.0971797697	0.0525161788	3.4242502327	0.0642
FAGECAT16	Female, Age 75-79	1	0.0372499527	0.0553927060	0.4522163792	0.5013
FAGECAT17	Female, Age 80-84	1	0.0456296818	0.0604287944	0.5701734901	0.4502

c-statistic=0.598

Appendix: Additional Tables

Table 6. Population Age Categories

Age Category	Range
1	0 – 4
2	5 – 9
3	10 – 14
4	15 – 17
5	18 - 24
6	25 - 29
7	30 - 34
8	35 – 39
9	40 - 44
10	45 - 49
11	50 - 54
12	55 - 59
13	60 - 64
14	65 - 69
15	70 - 74
16	75 - 79
17	80 - 84
14	85 - high