

Methodology Supplement - Regression Coefficients

Background

This document serves as a supplement to the paper titled "Medicare Risk Arrangement and Use and Outcomes Among Physician Groups", which was published in *JAMA Network Open* in January 2025. It provides regression coefficients of the models run for 20 different outcomes that are referenced in the manuscript.

For additional information, please refer to the methods section and the online supplemental material of the following publication: Cohen et al. "Medicare Risk Arrangement and Use and Outcomes Among Physician Groups." *JAMA Network Open* 8, no. 1 (2025): e2456074-e2456074.

Models Overview and variables

Multivariable logistic regression was employed to model 20 outcome measures as binary indicators. The primary comparison was made between at-risk Medicare Advantage (MA) and Fee-For-Service (FFS) MA cohorts within the same physician groups over the period of 2016 to 2019 (variable name: group_ma_risk).

Regression adjustments included the following set of covariates:

Table 1 List of Covariates and Labels

Variable	Variable name
Age groups	Age_group_64_and_under Age_group_65_69 Age_group_70_74 Age_group_75_79 Age_group_80_and_over
Sex	Sex_group_female Sex_group_male
Self-reported race and ethnicity (based on Research Triangle Institute race code)	Race_group_American_Indian__Ala Race_group_Asian__Pacific_Islan Race_group_Black__Or_African_Ame Race_group_Hispanic Race_group_Non_Hispanic_White Race_group_Other Race_group_Unknown
Dual-eligibility status	Dual_eligible
Calendar year	Year
Hierarchical Condition Category (HCC) Risk Adjustment Factor score, composite version 24	hcc_score_v24
Prevalence indicators for different high-level disease categories (based on high-level HCC groupings)	Neoplasm_v24 Diabetes_v24 Liver_v24 Blood_v24 Sa_v24

	Psychiatric_v24 Cvd_v24 Lung_v24 kidney_v24 skin_v24 injury_v24
Physician group of the attributed primary care physician (PCP) – as an indicator for the physician group	deid_group_name_Group1 deid_group_name_Group10 deid_group_name_Group11 deid_group_name_Group12 deid_group_name_Group13 deid_group_name_Group14 deid_group_name_Group15 deid_group_name_Group16 deid_group_name_Group17 deid_group_name_Group2 deid_group_name_Group3 deid_group_name_Group4 deid_group_name_Group5 deid_group_name_Group6 deid_group_name_Group7 deid_group_name_Group8 deid_group_name_Group9
MA plan mix (health maintenance organization (HMO) vs preferred provider organization)	plan_type_hmo

Table 2 List of Outcomes – Variable Names and Labels

Label	Variable name
COPD/Asthma IP Admissions - Older Adult	pqi_05_dummy
Hypertension IP Admissions	pqi_07_dummy
HF IP Admissions	pqi_08_dummy
Bacterial Pneumonia IP Admissions	pqi_11_dummy
UTI IP Admissions	pqi_12_dummy
Diabetes Lower-Extremity Amputation	pqi_16_dummy
PQI-91 Acute Composite	pqi_91_dummy
PQI-92 Chronic Composite	pqi_92_dummy
PQI-93 Diabetes Composite	pqi_93_dummy
Acute IP Admissions	Total Discharges
30-Day Readmissions	total_readmits_dummy
ED visits	ed_visits_total_dummy
Avoidable ED visits	ed_emergent_avoidable_dummy
Primary Care Treatable ED	ed_emergent_pc_treatable_dummy

IP through ED	ip source ed
High Risk Drug Use	high_risk_drug_user
Office Visits	office_visits
Med Adherence - RAS	compliant_ras
Med Adherence - Diabetes	compliant_diab
Med Adherence - Statin	compliant_stat

Table 3 Estimated covariate coefficients by outcome

Covariate	Coefficients										Total discharges	Total readmits
	Outcome:	PQI05	PQI07	PQI08	PQI11	PQI12	PQI16	PQI91	PQI92	PQI93		
Intercept		316.6002	3.5717	105.1754	207.4529	214.7432	63.5645	212.3617	161.5565	115.529	207.6485	261.9665
Year		-0.1619	-0.0064	-0.0555	-0.1064	-0.1104	0.0264	-0.1086	-0.0836	0.0403	-0.105	-0.1333
Age_group_64_and_under		0.393	0.0867	-0.4684	-0.4457	-0.729	1.0081	-0.5827	0.3804	1.1557	0.5587	0.4764
Age_group_65_69		0.2603	-0.0153	-0.3404	-0.5674	-0.8029	1.0587	-0.6854	0.1365	0.6631	0.3099	0.332
Age_group_70_74		0.1728	-0.0951	-0.2997	-0.5526	-0.6605	0.7781	-0.6117	0.0399	0.4642	0.2206	0.2307
Age_group_75_79		0.1306	-0.0281	-0.2184	-0.3935	-0.3887	0.5654	-0.396	0.0106	0.2905	0.148	0.1551
Age_group_80_and_over (reference)		0	0	0	0	0	0	0	0	0	0	0
Sex_group_female		0.3524	0.3961	-0.0773	0.1024	0.5565	-0.9627	0.3032	0.087	-0.266	0.0801	0.0438
Sex_group_male (reference)		0	0	0	0	0	0	0	0	0	0	0
Race_group_American_Indian__Ala		0.0083	-0.1419	0.1725	-0.1592	0.7296	-0.3137	0.2109	0.2389	0.5424	-0.0172	-0.2376
Race_group_Asian__Pacific_Islan		-0.0095	0.1871	-0.0929	-0.2305	-0.0277	-1.6338	-0.1746	-0.0323	-0.2678	-0.3052	-0.4499
Race_group_Black__Or_African_Ame		0.431	1.1341	0.5474	-0.2157	0.3623	-0.5137	0.0115	0.5624	0.4842	0.0584	-0.1438
Race_group_Hispanic		0.0422	0.3603	0.1635	-0.1145	0.4708	-0.1815	0.1261	0.2005	0.272	-0.0469	-0.2904
Race_group_Non_Hispanic_White		0.5294	0.1624	0.2112	0.0315	0.5997	-0.6622	0.2571	0.3241	0.2437	0.0961	-0.1055
Race_group_Other		0.0237	0.2932	0.1337	-0.2095	0.2795	-1.1385	-0.02	0.1115	-0.0711	-0.0935	-0.3357
Race_group_Unknown (reference)		0	0	0	0	0	0	0	0	0	0	0
Dual_eligible		0.2031	0.1536	-0.233	0.0252	0.305	-0.1612	0.1656	0.0415	0.1568	0.0132	-0.0501
Neoplasm_v24		-0.2576	-0.2405	-0.81	-0.0929	0.0673	-1.7545	-0.0157	-0.5675	-0.7485	0.0033	-0.128
Diabetes_v24		0.0195	0.2565	0.3602	0.0424	0.2101		0.1192	0.428	26.8214	-0.0821	0.0382
Liver_v24		-0.3619	-0.0155	-0.0422	-0.3124	-0.1375	-1.5173	-0.2367	-0.2168	-0.504	-0.0228	0.031
Blood_v24		-0.0385	-0.2048	-0.2366	0.501	0.9886	0.1778	0.727	-0.1598	-0.0531	0.4725	0.5696

Sa_v24	-0.1291	-0.1054	-0.5732	-0.2626	-0.1601	-0.5595	-0.2264	-0.3728	-0.244	-0.3028	-0.1895
Psychiatric_v24	-0.1847	-0.0736	-0.531	-0.1474	0.2814	-0.4322	0.0522	-0.3461	-0.1412	-0.2693	-0.2002
Cvd_v24	0.7916	1.231		0.6372	0.2322	-0.9522	0.4458	1.0661	-0.2181	0.4781	0.7566
Lung_v24	4.1252	-0.2074	0.6791	1.9462	-0.0601	-1.1214	0.989	1.1025	-0.5212	0.1009	0.1653
kidney_v24	-0.1389	0.9875	1.135	0.1031	0.4534	0.9281	0.2678	0.5753	0.9466	0.3313	0.5398
skin_v24	-0.6981	-0.5109	-0.6653	-0.1807	0.316	0.3484	0.0655	-0.0747	0.9183	-0.0473	-0.1196
injury_v24	-0.0867	0.0422	-0.4131	0.0441	0.3332	-1.02	0.1842	-0.2878	-0.3373	1.3921	0.7772
hcc_score_v24	0.3746	0.3531	0.7403	0.3322	0.3097	0.8975	0.3291	0.5922	0.5708	0.8353	0.7167
plan_type_hmo	-0.0921	-0.113	-0.0855	-0.2317	-0.2477	0.1508	-0.2378	-0.077	0.0009	-0.1787	-0.1881
deid_group_name_Group1	-0.26	-0.0357	-0.2607	0.1927	0.1218	1.4315	0.184	-0.1485	0.2525	0.1442	0.1703
deid_group_name_Group10	-0.089	0.2356	-0.5008	-0.2004	0.4064	0.9045	0.0636	-0.2211	0.2469	-0.0404	0.0869
deid_group_name_Group11	-0.521	16.929 9	-0.2903	-0.3739	0.8528	17.496 9	0.2822	-0.3768	-0.5814	-0.0415	-0.7403
deid_group_name_Group12	-0.042	0.2918	0.1526	0.2172	0.3688	1.5419	0.2889	0.1873	0.5173	0.4303	0.6499
deid_group_name_Group13	0.2567	0.2047	-0.0208	0.2887	0.9083	0.9121	0.5662	0.1947	0.3904	0.4976	0.642
deid_group_name_Group14	-0.2161	0.1088	0.3393	-0.0517	-0.215	0.3383	-0.1163	0.2035	0.125	0.3354	0.3187
deid_group_name_Group15	-0.0986	0.8055	0.2838	0.2331	0.5872	1.4809	0.3918	0.2153	0.0222	0.5175	0.1878
deid_group_name_Group16	0.2391	0.6974	-0.2491	0.2415	0.9977	-0.9045	0.593	0.0626	-0.1872	0.4365	0.6338
deid_group_name_Group17	0.4669	0.2185	-0.2433	0.1848	0.4909	1.4606	0.3081	0.2121	0.7207	0.1563	0.3283
deid_group_name_Group2	0.5173	0.4017	-0.035	0.5544	0.9398	1.4808	0.7296	0.3191	0.5485	0.4629	0.6583
deid_group_name_Group3	0.1596	0.4204	-0.8041	-0.3741	0.3382	-0.2565	-0.0387	-0.2883	-0.3193	0.1412	0.166
deid_group_name_Group4	0.3852	0.0529	0.0524	0.2472	0.6415	0.8463	0.4217	0.2408	0.2702	0.3711	0.4655
deid_group_name_Group5	0.2963	0.3042	-0.1017	0.2683	1.0979	1.1007	0.6636	0.1843	0.492	0.3635	0.5228
deid_group_name_Group6	0.3329	0.4892	-0.0135	0.2479	0.5694	-0.6414	0.3982	0.2812	0.167	0.5357	0.6161
deid_group_name_Group7	0.7235	0.1004	-0.5449	0.4571	0.9035	1.0749	0.6433	-0.0888	-0.0232	-0.1862	0.0154
deid_group_name_Group8	-0.1478	-0.1716	-0.5529	-0.2205	0.2738	-0.4949	-0.016	-0.3254	0.0368	0.126	0.2442
deid_group_name_Group9 (reference)	0	0	0	0	0	0	0	0	0	0	0
group_ma_risk	-0.2564	-0.2045	-0.0955	-0.136	-0.1546	0.0993	-0.1456	-0.163	-0.0899	-0.1336	-0.1718

Table 3 Con't

Covariate	Coefficients								
Outcome:	ED VISITS	ED EMERGENT AVOIDABLE	ED EMERGENT PC TREATABLE	IP SOURCE ED	HIGH RISK DRUG USER	OFFICE VISITS	COMPLIANT RAS	COMPLIANT DIAB	COMPLIANT STAT
Intercept	79.5305	114.3354	75.8918	186.9312	299.6356	212.6824	-383.013	-161.296	-356.62
year	-0.0404	-0.0593	-0.0395	-0.095	-0.1503	-0.1044	0.1911	0.0807	0.178
age_group_64_and_under	0.4734	0.5428	0.624	0.4007	1.1138	0.9631	-0.2043	-0.2453	-0.2485
age_group_65_69	-0.0333	0.0823	0.0868	0.1261	0.192	0.4449	-0.0588	-0.1433	-0.1565
age_group_70_74	-0.0976	-0.0105	0.0059	0.0551	0.0635	0.4112	0.0111	-0.0889	-0.0779
age_group_75_79	-0.0848	-0.009	-0.0138	0.0218	0.0503	0.4623	0.0117	-0.0579	-0.055
age_group_80_and_over (reference)	0	0	0	0	0	0	0	0	0
sex_group_female	0.2164	0.2207	0.2146	0.0752	0.5888	0.1423	0.0405	0.0072	-0.0937
sex_group_male (reference)	0	0	0	0	0	0	0	0	0
race_group_American_Indian__Ala	0.3291	0.4336	0.4972	-0.0178	0.2007	0.4135	-0.3616	-0.4804	-0.4405
race_group_Asian__Pacific Islan	-0.3025	-0.169	-0.2876	-0.1841	-0.2306	0.3165	-0.1077	-0.0356	-0.2143
race_group_Black__Or African Ame	0.4363	0.4026	0.4924	0.1812	-0.1027	0.2678	-0.3802	-0.368	-0.5356
race_group_Hispanic	0.1855	0.1931	0.2721	0.0158	-0.0666	0.6036	-0.1936	-0.2833	-0.3978
race_group_Non_Hispanic_White	0.1801	0.2537	0.1832	0.1132	0.2228	0.1748	-0.0132	-0.0403	-0.0728
race_group_Other	-0.0077	0.0843	0.0019	0.0183	-0.177	0.1015	-0.1033	-0.0966	-0.2271
race_group_Unknown (reference)	0	0	0	0	0	0	0	0	0
dual_eligible	0.2947	0.3095	0.3874	0.09	0.3048	-0.3136	-0.148	0.0325	-0.1142
neoplasm_v24	-0.0215	-0.1573	0.0777	-0.2492	0.0231	1.5728	0.076	0.0517	0.029
diabetes_v24	-0.0228	0.4405	0.0767	-0.0702	0.0212	0.8791	0.1151	0.1433	0.1504
liver_v24	0.0955	-0.1016	0.1909	-0.0001	-0.0112	0.8291	-0.1008	-0.1025	-0.1131
blood_v24	0.2039	0.0713	0.067	0.5858	-0.073	0.3845	0.0184	0.0377	0.018
sa_v24	-0.1169	-0.0932	0.0239	-0.1643	0.1231	0.6084	0.1046	0.0702	0.0824
psychiatric_v24	0.0428	-0.0273	0.1426	-0.2324	0.8335	0.2977	0.0257	0.0162	0.0241
cvd_v24	0.2514	0.3812	0.3343	0.6736	-0.0171	0.8915	0.0913	0.0716	0.1216
lung_v24	0.111	1.2145	0.2962	0.0956	0.1078	0.6709	-0.0188	0.0122	-0.0097

kidney_v24	0.1475	0.2111	0.0654	0.4327	-0.0119	0.6791	0.0289	0.0253	0.1084
skin_v24	0.0269	0.1103	0.2119	-0.2355	-0.0715	-0.4506	-0.1201	-0.0956	-0.0807
injury_v24	1.4737	0.1203	0.1656	1.4315	0.1745	0.3437	-0.2493	-0.1982	-0.2672
hcc_score_v24	0.5406	0.3254	0.2013	0.8138	0.1014	-0.38	-0.1267	-0.0544	-0.0732
plan_type_hmo	-0.0215	-0.027	0.0244	-0.1818	-0.0511	-0.1644	0.0147	0.0111	0.0447
deid_group_name_Group1	-0.0876	-0.2731	-0.099	0.1415	-0.0021	0.7146	-0.4014	-0.3271	-0.4361
deid_group_name_Group10	-0.3802	-0.5368	-0.3189	0.0097	-0.1442	1.1414	-0.4398	-0.3526	-0.4627
deid_group_name_Group11	0.3013	-0.6274	-0.2865	0.3349	-0.2202	-2.0256	-0.9026	-0.5728	-1.1364
deid_group_name_Group12	-0.1147	-0.2372	-0.2117	0.5907	0.0467	0.6879	-0.4539	-0.3424	-0.392
deid_group_name_Group13	-0.0726	-0.1929	-0.1669	0.6134	0.1039	1.4766	-0.4449	-0.3284	-0.4407
deid_group_name_Group14	-0.0365	-0.2901	-0.0726	0.3536	-0.1542	0.3884	-0.3094	-0.073	-0.2744
deid_group_name_Group15	0.0581	-0.0677	-0.0206	0.6357	0.2064	0.2336	-0.3429	-0.1895	-0.3027
deid_group_name_Group16	-0.0975	-0.2102	-0.1766	0.6133	-0.0589	1.3185	-0.5088	-0.2847	-0.5213
deid_group_name_Group17	-0.2606	-0.2446	-0.267	0.1955	0.1269	1.434	-0.6791	-0.5255	-0.6398
deid_group_name_Group2	-0.0432	-0.1273	-0.1087	0.5669	0.122	1.0222	-0.5334	-0.4315	-0.5342
deid_group_name_Group3	-0.329	-0.542	-0.3194	0.1073	-0.0801	1.2313	-0.4831	-0.4431	-0.5253
deid_group_name_Group4	-0.0475	-0.1401	-0.1274	0.5296	0.0193	1.2669	-0.4802	-0.375	-0.4042
deid_group_name_Group5	-0.084	-0.1744	-0.1023	0.5414	0.0734	1.2801	-0.737	-0.5844	-0.7724
deid_group_name_Group6	0.0067	-0.1669	-0.1107	0.7145	-0.1465	0.9929	-0.3753	-0.2344	-0.3263
deid_group_name_Group7	-0.2724	-0.495	0.0728	-2.0732	0.2415	1.2054	-1.1272	-0.6524	-1.3424
deid_group_name_Group8	-0.2675	-0.4497	-0.2667	0.0804	-0.0466	2.1101	-0.4621	-0.3915	-0.4893
deid_group_name_Group9 (reference)	0	0	0	0	0	0	0	0	0
group_ma_risk	-0.1475	-0.1256	-0.1964	-0.1352	-0.1943	-0.0537	0.0417	-0.0214	0.0236