



Model Specifications for Clinical Indicators



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Model Specifications for Clinical Indicators

Please note that all coefficients were developed based on 3 years of pooled data (2018–2019 to 2020–2021) unless otherwise specified. Please email hsp@cihi.ca if further details are required.

1 Hip Fracture Surgery Within 48 Hours

Risk factor	Regression coefficient	Pr > ChiSq (Wald)	ICD-10-CA codes	Qualifier
Intercept	2.145571158	<0.0001	—	—
Sex (male = 1, female = 0)	-0.174764157	<0.0001	—	—
Heart failure or pulmonary edema	-0.863446052	<0.0001	I50, J81	Type (1) or [(W), (X) or (Y) but not (2)]
Chronic obstructive pulmonary disease	-0.648834122	<0.0001	J41, J42, J43, J44, J47	Type (1) or [(W), (X) or (Y) but not (2)]
Ischemic heart disease (acute)	-1.316500882	<0.0001	I20, I21, I22, I24,	Type (1) or [(W), (X) or (Y) but not (2)]
Cardiac dysrhythmias	-0.806050998	<0.0001	I47, I48, I49	Type (1) or [(W), (X) or (Y) but not (2)]
Ischemic heart disease (chronic)	-0.261666277	0.0657	I25	Type (1) or [(W), (X) or (Y) but not (2)]
Hypertension	-0.241735328	<0.0001	I10, I11, I12, I13, I15	Type (1) or [(W), (X) or (Y) but not (2)]
Diabetes with complications	-0.38458406	<0.0001	E10.0–E10.7, E11.0–E11.7, E13.0–E13.7, E14.0–E14.7	Type (1), (3) or [(W), (X) or (Y) but not (2)]
Age 18 to 54 (vs. 65 to 74)	0.565735562	<0.0001	—	—
Age 55 to 64 (vs. 65 to 74)	0.119464709	0.0186	—	—
Age 75 to 84 (vs. 65 to 74)	-0.065442241	0.0568	—	—
Age 85 to 94 (vs. 65 to 74)	-0.154618509	<0.0001	—	—
Age 95 and older (vs. 65 to 74)	-0.122593831	0.0156	—	—
COVID-19	-0.671170442	0.0003	U071, U072	Type (M), (1), (C), (2), (W), (X) or (Y)

Note

— Not applicable.

2 Medical Patients Readmitted to Hospital

Risk factor	Regression coefficient	Pr > ChiSq (Wald)
Intercept	-2.966784628	<.0001
Age 45 to 64 (vs. 18 to 44)	0.038004878	<.0001
Age 65 to 84 (vs. 18 to 44)	0.067023859	<.0001
Age 85 and older (vs. 18 to 44)	0.061790966	<.0001
Male (vs. female)	0.038200694	<.0001
Urgent admission	0.540800594	<.0001
1 acute care hospitalization in previous 6 months (vs. none)	0.524812976	<.0001
2 or more acute care hospitalizations in previous 6 months (vs. none)	1.163188816	<.0001
Charlson score group 1* (vs. 0)	0.247093788	<.0001
Charlson score group 2* (vs. 0)	0.398744934	<.0001
COVID-19	-0.088599671	0.0207
CMG 026	-0.458941047	<.0001
CMG 040	-0.205303572	<.0001
CMG 042	0.615552677	<.0001
CMG 130	0.327051485	<.0001
CMG 132	0.444512988	<.0001
CMG 133	-0.100433487	0.0174
CMG 135	0.297071628	<.0001
CMG 136	0.059410296	0.0174
CMG 138	0.067699659	<.0001
CMG 139	0.464686098	<.0001
CMG 142	0.259867159	<.0001
CMG 143	0.493376617	<.0001
CMG 149	0.229260946	<.0001
CMG 193	-0.142937063	<.0001
CMG 194	0.321124297	<.0001
CMG 196	0.377376319	<.0001
CMG 200	-0.146501225	<.0001
CMG 202	0.129639473	<.0001
CMG 204	0.095497864	0.0002
CMG 205	-0.278903401	<.0001
CMG 208	-0.335511812	<.0001
CMG 209	0.074101217	<.0001
CMG 213	0.108360215	<.0001
CMG 248	0.22129338	<.0001
CMG 249	0.045054731	0.0003

Risk factor	Regression coefficient	Pr > ChiSq (Wald)
CMG 250	0.465920644	<.0001
CMG 253	0.287399955	<.0001
CMG 254	0.116200583	<.0001
CMG 255	0.231762499	<.0001
CMG 256	0.156359232	<.0001
CMG 257	0.338993259	<.0001
CMG 258	0.286363761	<.0001
CMG 284	0.540837152	<.0001
CMG 285	0.836222222	<.0001
CMG 287	0.215008212	<.0001
CMG 288	0.395395693	<.0001
CMG 359	0.436694861	<.0001
CMG 360	0.131971271	<.0001
CMG 364	0.160557211	<.0001
CMG 405	0.211310769	<.0001
CMG 436	0.229882004	<.0001
CMG 437	0.197572854	<.0001
CMG 477	0.30099477	<.0001
CMG 484	0.223211728	<.0001
CMG 487	0.101564286	<.0001
CMG 488	-0.152884215	<.0001
CMG 628	0.760256977	<.0001
CMG 633	0.222137709	<.0001
CMG 635	0.287539302	<.0001
CMG 638	-0.137610795	<.0001
CMG 654	0.196724202	<.0001
CMG 660	0.276726459	<.0001
CMG 662	0.172390356	<.0001
CMG 765	-0.062744887	0.0189
CMG 776	-0.104489552	<.0001
CMG 778	-0.340770859	<.0001
CMG 780	-0.10946623	<.0001
CMG 805	-0.265764458	<.0001
CMG 806	-0.273055913	<.0001
CMG 811	0.054853225	<.0001

Notes

* Charlson score group 1 = Charlson score 1–2 outside Quebec and 2–4 in Quebec; Charlson score group 2 = Charlson score 3 or higher outside Quebec and 5 or higher in Quebec (reference category is Charlson score group 0 = Charlson score 0 outside Quebec and 0–1 in Quebec). For further details on the Charlson Index, please refer to the [General Methodology Notes](#) document. CMGs included in the model are those that account for the top 80% of the total number of readmissions among medical patients.

3 Surgical Patients Readmitted to Hospital

Risk factor	Regression coefficient	Pr > ChiSq (Wald)
Intercept	-3.268794252	<.0001
Age 45 to 64 (vs. 18 to 44)	0.042620423	<.0001
Age 65 to 84 (vs. 18 to 44)	0.220376291	<.0001
Age 85 and older (vs. 18 to 44)	0.380122105	<.0001
Male (vs. female)	0.035441595	<.0001
Urgent admission	0.414171839	<.0001
1 acute care hospitalization in previous 6 months (vs. none)	0.451154618	<.0001
2 or more acute care hospitalizations in previous 6 months (vs. none)	0.940898774	<.0001
Charlson score group 1* (vs. 0)	0.420481023	<.0001
Charlson score group 2* (vs. 0)	0.576075958	<.0001
COVID-19	0.227544143	0.0007
CMG 009	0.558868316	<.0001
CMG 012	-0.311914307	<.0001
CMG 114	-0.1067726	0.0021
CMG 117	0.335424521	<.0001
CMG 121	0.390234407	<.0001
CMG 161	-0.105676942	0.0068
CMG 163	0.722602437	<.0001
CMG 166	0.264576605	<.0001
CMG 170	0.187293911	<.0001
CMG 172	0.117194624	<.0001
CMG 175	-0.052400461	0.0008
CMG 176	-0.186226736	<.0001
CMG 178	0.301998211	<.0001
CMG 179	-0.332981319	<.0001
CMG 181	0.20815657	<.0001
CMG 182	0.555426964	<.0001
CMG 185	0.362807654	<.0001
CMG 187	-0.133660113	<.0001
CMG 189	0.264508571	<.0001
CMG 190	0.606652617	<.0001
CMG 194	0.134333771	0.0006
CMG 221	1.000496022	<.0001
CMG 222	0.296117038	<.0001
CMG 223	0.390096217	<.0001

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Risk factor	Regression coefficient	Pr > ChiSq (Wald)
CMG 225	0.392604722	<.0001
CMG 226	0.344513879	<.0001
CMG 227	0.157868856	<.0001
CMG 228	-0.519648457	<.0001
CMG 229	-0.227822338	<.0001
CMG 231	0.611724886	<.0001
CMG 232	0.383479226	<.0001
CMG 233	0.011711254	0.6842
CMG 234	-0.888828337	<.0001
CMG 237	0.41704221	<.0001
CMG 271	0.835768763	<.0001
CMG 274	0.53918063	<.0001
CMG 275	0.511019257	<.0001
CMG 278	-0.241941214	<.0001
CMG 280	0.610467374	<.0001
CMG 281	-0.026410578	0.4064
CMG 282	0.490588375	<.0001
CMG 313	-0.070245234	0.0098
CMG 317	0.098343609	0.0311
CMG 320	-0.489875422	<.0001
CMG 321	-0.658573178	<.0001
CMG 330	-0.19856986	<.0001
CMG 381	0.441747269	<.0001
CMG 382	0.254751328	<.0001
CMG 392	0.068928313	0.145
CMG 422	0.293196087	<.0001
CMG 424	-0.773193006	<.0001
CMG 450	1.252711579	<.0001
CMG 452	1.307119395	<.0001
CMG 454	0.094546985	0.0016
CMG 455	0.37841053	<.0001
CMG 456	0.227749327	<.0001
CMG 458	0.523874682	<.0001
CMG 459	0.037097558	0.2785
CMG 462	-0.095553217	0.0134
CMG 464	0.072620228	0.0005
CMG 501	-0.225465363	<.0001
CMG 502	-0.240015638	<.0001

Risk factor	Regression coefficient	Pr > ChiSq (Wald)
CMG 615	0.51609107	<.0001
CMG 617	0.349134956	<.0001
CMG 618	0.640855626	<.0001
CMG 650	0.522990256	<.0001
CMG 726	-0.249334188	<.0001
CMG 727	-0.365802921	<.0001
CMG 729	-0.703939209	<.0001
CMG 731	-0.004122278	0.9344
CMG 733	0.527029521	<.0001
CMG 734	0.408316045	<.0001
CMG 737	-0.054891964	0.1979
CMG 747	-0.967080563	<.0001
CMG 752	0.397207495	<.0001
CMG 801	0.045882433	0.3053
CMG 805	-0.112471492	0.0009
CMG 806	0.129318206	<.0001
CMG 904	0.58957321	<.0001
CMG 905	0.63396596	<.0001
CMG 906	0.587556168	<.0001
CMG 910	0.537799457	<.0001
CMG 162	0.498792874	<.0001
CMG 610	0.267033177	<.0001

Notes

* Charlson score group 1 = Charlson score 1–2 outside Quebec and 2–4 in Quebec; Charlson score group 2 = Charlson score 3 or higher outside Quebec and 5 or higher in Quebec (reference category is Charlson score group 0 = Charlson score 0 outside Quebec and 0–1 in Quebec). For further details on the Charlson Index, please refer to the [General Methodology Notes](#) document. CMGs included in the model are those that account for the top 80% of the total number of readmissions among surgical patients.

4 Pediatric Patients Readmitted to Hospital

Risk factor	Regression coefficient	Pr > ChiSq (Wald)
Intercept	-3.450752228	<.0001
Age 5 to 9 (vs. 0 to 4)	-0.151598147	<.0001
Age 10 to 14 (vs. 0 to 4)	-0.131460532	<.0001
Age 15 to 17 (vs. 0 to 4)	-0.055923412	0.007
Male (vs. female)	0.001217336	0.9202
Urgent admission	0.488038787	<.0001
1 acute care hospitalization in previous 6 months (vs. none)	0.778689259	<.0001

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Risk factor	Regression coefficient	Pr > ChiSq (Wald)
2 or more acute care hospitalizations in previous 6 months (vs. none)	1.586539501	<.0001
CMG 005	1.070662555	<.0001
CMG 009	0.857042999	<.0001
CMG 011	1.059811007	<.0001
CMG 037	0.029906034	0.7927
CMG 039	0.547658918	<.0001
CMG 040	0.290575113	<.0001
CMG 041	0.37179272	<.0001
CMG 042	0.625753251	<.0001
CMG 086	0.21813455	<.0001
CMG 097	0.022630471	0.5926
CMG 101	-0.191297939	0.0926
CMG 102	-0.390195784	<.0001
CMG 103	-0.354761946	0.0004
CMG 104	0.051592583	0.4931
CMG 105	-0.125249245	0.0604
CMG 135	0.861187924	<.0001
CMG 136	0.104151563	0.2057
CMG 138	-0.020168706	0.5762
CMG 141	0.09269186	0.0035
CMG 147	-0.497964053	<.0001
CMG 148	-0.002823314	0.9628
CMG 149	0.465220616	<.0001
CMG 163	0.439317654	<.0001
CMG 202	0.385920749	0.0005
CMG 209	0.60551751	<.0001
CMG 221	1.264062072	<.0001
CMG 233	0.399881776	<.0001
CMG 234	-0.551511041	<.0001
CMG 237	0.599160858	<.0001
CMG 248	0.776385844	<.0001
CMG 249	0.038231727	0.3591
CMG 253	0.570669174	<.0001
CMG 254	0.507706174	<.0001
CMG 255	0.634060146	<.0001
CMG 256	0.437138198	<.0001
CMG 257	0.493990742	<.0001

Risk factor	Regression coefficient	Pr > ChiSq (Wald)
CMG 258	0.626104725	<.0001
CMG 287	0.77179939	<.0001
CMG 288	0.869315827	<.0001
CMG 361	0.587296774	<.0001
CMG 405	-0.42822954	<.0001
CMG 407	-0.226783371	0.008
CMG 432	0.070643886	0.51
CMG 433	0.451247226	<.0001
CMG 435	0.9490517	<.0001
CMG 436	0.59278519	<.0001
CMG 437	-0.402015665	<.0001
CMG 438	0.204560813	0.0211
CMG 454	0.660252317	<.0001
CMG 477	0.466854139	0.0001
CMG 480	0.545997454	<.0001
CMG 487	0.04430113	0.4179
CMG 488	-0.121172296	0.0801
CMG 587	0.484065893	<.0001
CMG 588	0.344503466	<.0001
CMG 589	0.382488666	<.0001
CMG 591	0.132400101	0.1583
CMG 592	0.122922881	0.0997
CMG 594	0.271857266	<.0001
CMG 600	0.429681555	<.0001
CMG 601	0.195793256	<.0001
CMG 602	0.793540063	<.0001
CMG 625	1.575676103	<.0001
CMG 633	0.002207721	0.9677
CMG 634	0.611930114	<.0001
CMG 635	0.218749324	0.0434
CMG 636	0.907686885	<.0001
CMG 637	0.625340368	<.0001
CMG 638	0.513814221	<.0001
CMG 654	0.292244918	0.0039
CMG 660	0.09112271	0.2932
CMG 661	-0.139196939	0.0089
CMG 662	0.081198642	0.1205
CMG 778	-0.607991247	<.0001
CMG 780	0.120932463	0.1711

Risk factor	Regression coefficient	Pr > ChiSq (Wald)
CMG 782	0.179397951	0.0489
CMG 806	0.167172146	0.0229
CMG 811	0.253376216	<.0001
CMG 812	0.094763296	0.2939
CMG 993	-0.184315848	0.0681
CMG 610	0.632375966	<.0001

Note

CMGs included in the model are those that account for the top 80% of the total number of readmissions among patients age 17 and younger.

5 Obstetric Patients Readmitted to Hospital

Risk factor	Regression coefficient	Pr > ChiSq (Wald)
Intercept	-4.401762294	<.0001
Age 24 and younger (vs. 25 to 34)	0.120435456	<.0001
Age 35 and older (vs. 25 to 34)	0.162748228	<.0001
Urgent admission	1.326379014	<.0001
1 acute care hospitalization in previous 6 months (vs. none)	0.587561542	<.0001
2 or more acute care hospitalizations in previous 6 months (vs. none)	1.255740907	<.0001
COVID-19	0.457077983	0.0436

6 Hospital Deaths Following Major Surgery

Risk factor	Regression coefficient	Pr > ChiSq (Wald)	ICD-10-CA/other codes	Qualifier
Intercept	-7.192172738	<.0001	—	—
Male (vs. female)	0.212628698	<.0001	sex_code = M	—
Age 45 to 64 (vs. 18 to 44)	0.489664721	<.0001	45 ≤ age_years ≤ 64	—
Age 65 to 74 (vs. 18 to 44)	0.891268422	<.0001	65 ≤ age_years ≤ 74	—
Age 75 to 84 (vs. 18 to 44)	1.358581131	<.0001	75 ≤ age_years ≤ 84	—
Age 85+ (vs. 18 to 44)	1.945962373	<.0001	85 ≤ age_years	—
Charlson Index score of 1 or 2 (vs. 0) (modified for Quebec records)*	0.914488146	<.0001	Please refer to General Methodology Notes for details	—
Charlson Index score of 3 or more (vs. 0) (modified for Quebec records)*	1.386129472	<.0001	Please refer to General Methodology Notes for details	—

Risk factor	Regression coefficient	Pr > ChiSq (Wald)	ICD-10-CA/other codes	Qualifier
Emergent surgery (vs. elective)	1.54748634	<.0001	admission_category_code = U and major surgery within 1 day of admission (same day or next day)	—
Urgent surgery (vs. elective)	1.478226277	<.0001	admission_category_code = U and major surgery not within 1 day of admission (not same day or next day)	—
Transfer patients	0.445099195	<.0001	Patients who are transferred in from another acute institution	—
COVID-19	1.010292531	<.0001	U071, U072	Type (M), (1), (C), (2), (W), (X) or (Y)
CMG 004	2.571666921	<.0001	—	—
CMG 005	2.88390527	<.0001	—	—
CMG 009	1.050906228	<.0001	—	—
CMG 015	2.44045106	<.0001	—	—
CMG 163	2.102541372	<.0001	—	—
CMG 166	0.547515846	<.0001	—	—
CMG 180	1.809447112	<.0001	—	—
CMG 181	1.987564849	<.0001	—	—
CMG 182	1.110949243	<.0001	—	—
CMG 190	1.108274973	<.0001	—	—
CMG 221	1.650845166	<.0001	—	—
CMG 222	1.201205639	<.0001	—	—
CMG 223	0.679112168	<.0001	—	—
CMG 225	1.36923301	<.0001	—	—
CMG 330	0.580152151	<.0001	—	—
CMG 618	1.985206439	<.0001	—	—
CMG 726	0.538351514	<.0001	—	—
CMG 727	0.541461739	<.0001	—	—
CMG 731	0.929730831	<.0001	—	—
CMG 733	2.070007352	<.0001	—	—
CMG 752	2.079212947	<.0001	—	—
CMG 162	0.756828514	<.0001	—	—

Notes

* Charlson score group 1 = Charlson score 1–2 outside Quebec and 2–4 in Quebec; Charlson score group 2 = Charlson score 3 or higher outside Quebec and 5 or higher in Quebec (reference category is Charlson score group 0 = Charlson score 0 outside Quebec and 0–1 in Quebec). For further details on the Charlson Index, please refer to the [General Methodology Notes](#) document.
 — Not applicable.

CMGs included in the model are those that account for the top 80% of the total number of deaths among major surgery patients.

7 In-Hospital Sepsis

Risk factor	Children (age 17 and younger)		Adults (age 18 and older)		ICD-10-CA codes or qualifier	
	Regression coefficient	Pr > ChiSq (Wald)	Regression coefficient	Pr > ChiSq (Wald)		
Intercept	-7.680241858	<0.0001	-7.406229643	<0.0001	—	—
Age 1 to 4 (vs. 5 to 9)	0.053031671	0.6996	—	—	—	—
Age 10 to 14 (vs. 5 to 9)	0.264072139	0.0604	—	—	—	—
Age 15 to 17 (vs. 5 to 9)	0.241286399	0.1065	—	—	—	—
Age 30 to 44 (vs. 18 to 29)	—	—	-0.050698926	0.2191	—	—
Age 45 to 59 (vs. 18 to 29)	—	—	0.195975032	<0.0001	—	—
Age 60 to 74 (vs. 18 to 29)	—	—	0.287083037	<0.0001	—	—
Age 75 to 89 (vs. 18 to 29)	—	—	0.198452014	<0.0001	—	—
Age 90 and older (vs. 18 to 29)	—	—	-0.115295223	0.0142	—	—
Male (vs. female)	-0.029896529	0.7566	0.273660725	<0.0001	—	—
Urgent admission	0.115334185	0.2844	0.70238129	<0.0001	—	—
Modified Charlson score group 1* (vs. 0)	1.204725795	<0.0001	0.75387311	<0.0001	Please refer to General Methodology Notes for details	
Modified Charlson score group 2* (vs. 0)	1.340202703	<0.0001	1.291799697	<0.0001	Please refer to General Methodology Notes for details	
Immunocompromised states [†] (Quebec records)	1.611805902	<0.0001	0.58195517	<0.0001	ICD-10-CA codes: B24, B485, B59, D47.1, D70.–, D71, D72.0, D80.– to D86.–, D89.8, D89.9, E40 to E43, K91.2, N18.–, O98.7–, T86.–, Y83.0, Z49.–, Z94.0 to Z94.4, Z94.8–, Z94.9, Z99.2	For ICD-10-CA codes: Type (M), (1), (C), (2), (9) or [(W), (X) or (Y) but not (2)]
Immunocompromised states [†] (non-Quebec records)	2.36238703	<0.0001	1.497100563	<0.0001	CCI codes: 1.GJ.85.^, 1.GR.85.^, 1.GT.85.^, 1.HY.85.^, 1.HZ.85.^, 1.LZ.19. HH-U7-A, 1.LZ.19. HH-U7-J, 1.LZ.19.HH-U8-A, 1.LZ.19.HH-U8-J, 1.NK.85.^, 1.NP.85.^, 1.OA.85.^, 1.OB.85.^, 1.OJ.85.^, 1.OK.85.^, 1.PC.85.^, 1.WY.19.^	

Risk factor	Children (age 17 and younger)		Adults (age 18 and older)		ICD-10-CA codes or qualifier
	Regression coefficient	Pr > ChiSq (Wald)	Regression coefficient	Pr > ChiSq (Wald)	
Surgical patients	1.583965264	<0.0001	1.172098605	<0.0001	Major clinical category partition code = I (intervention)
COVID-19	—	—	1.618691844	<0.0001	ICD-10-CA codes: U07.1, U07.2 Type (M), (1), (C), (2), (W), (X) or (Y)

Notes

* Modified Charlson score group 1 = modified Charlson score 1–2 outside Quebec and 2–4 in Quebec; modified Charlson score group 2 = modified Charlson score 3 or higher outside Quebec and 5 or higher in Quebec (reference category is modified Charlson score group 0 = modified Charlson score 0 outside Quebec and 0–1 in Quebec). For further details on the modified Charlson Index, please refer to the [General Methodology Notes](#) document.

† Based on the list of codes developed by the Agency for Healthcare Research and Quality (AHRQ) and Organisation for Economic Co-operation and Development (OECD) for patient safety indicators. This risk factor has 2 coefficients — 1 for the data submitted by Quebec and 1 for all other jurisdictions. Quebec-specific coefficients were included in the model to address differences in data collection.

— Not applicable.

8 Obstetric Trauma (With Instrument)

Risk factor	Regression coefficient	Pr > ChiSq (Wald)	ICD-10-CA/other codes	Qualifier
Intercept	-1.513622206	<0.0001	—	—
Age 19 and younger (vs. 25 to 29)	-0.656780312	<0.0001	age_years ≤ 19	—
Age 20 to 24 (vs. 25 to 29)	-0.315673426	<0.0001	20 ≤ age_years ≤ 24	—
Age 30 to 34 (vs. 25 to 29)	-0.016976951	0.3948	30 ≤ age_years ≤ 34	—
Age 35 to 39 (vs. 25 to 29)	-0.219489229	<0.0001	35 ≤ age_years ≤ 39	—
Age 40 and older (vs. 25 to 29)	-0.333198571	<0.0001	age_years ≥ 40	—
Malposition/malpresentation of the fetus	0.104175336	<0.0001	O32.001, O32.201, O32.301, O32.401, O32.501, O32.601, O32.801, O32.901, O64.001, O64.201, O64.301, O64.401, O64.501, O64.801, O64.901	Type (M), (1), (C), (2), (W), (X) or (Y)
Gestational age at delivery ≥41 weeks	0.198087076	<0.0001	Gestational age at delivery >40 completed weeks	—
Diabetes (pre-existing/gestational)	0.11654186	<0.0001	O24.501, O24.601, O24.701, O24.801	Type (M), (1), (C), (2), (W), (X) or (Y)
Fetal heart rate anomaly/asphyxia during labour and delivery	-0.019719846	0.2902	O68.001, O68.201, O68.301	Type (M), (1), (C), (2), (W), (X) or (Y)
Shoulder dystocia	0.134990415	<0.0001	O66.001	Type (M), (1), (C), (2), (W), (X) or (Y)
Prolonged second-stage labour	0.278736733	<0.0001	O63.101	Type (M), (1), (C), (2), (W), (X) or (Y)
Large fetus	0.319552805	<0.0001	If newborn weight ≥4,000 g (requires mom/newborn linkage)	—

Note

— Not applicable.

9 Obstetric Trauma: Vaginal Delivery Without Instrument

Risk factor	Regression coefficient	Pr > ChiSq (Wald)	ICD-10-CA/other codes	Qualifier
Intercept	-3.277168475	<0.0001	—	—
Age 19 and younger (vs. 25 to 29)	-0.327017861	<0.0001	—	—
Age 20 to 24 (vs. 25 to 29)	-0.266844917	<0.0001	—	—
Age 30 to 34 (vs. 25 to 29)	-0.07808334	<0.0001	—	—
Age 35 to 39 (vs. 25 to 29)	-0.326539802	<0.0001	—	—
Age 40 and older (vs. 25 to 29)	-0.67554015	<0.0001	—	—
Malpresentation/ malpresentation of the fetus	0.262553905	<0.0001	O32.001, O32.201, O32.301, O32.401, O32.501, O32.601, O32.801, O32.901, O64.001, O64.201, O64.301, O64.401, O64.501, O64.801, O64.901	Type (M), (1), (C), (2), (W), (X) or (Y)
Large fetus	0.343953415	<0.0001	Newborn weight ≥4,000 g (requires mom/newborn linkage)	—
Gestational age at delivery ≥41 weeks	0.30912314	<0.0001	Gestational age at delivery >40 completed weeks	—
Diabetes (pre-existing/ gestational)	0.084195999	0.0001	O24.501, O24.601, O24.701, O24.801	Type (M), (1), (C), (2), (W), (X) or (Y)
Fetal heart rate anomaly/asphyxia during labour and delivery	0.327796188	<0.0001	O68.001, O68.201, O68.301	Type (M), (1), (C), (2), (W), (X) or (Y)
Shoulder dystocia	0.46789547	<0.0001	O66.001	Type (M), (1), (C), (2), (W), (X) or (Y)
Prolonged second-stage labour	0.744366056	<0.0001	O63.101	Type (M), (1), (C), (2), (W), (X) or (Y)

Note

— Not applicable.

10 Low-Risk Caesarean Sections

Risk factor	Regression coefficient	Pr > ChiSq (Wald)	ICD-10-CA/ other codes	Qualifier
Intercept	-1.703169934	<0.0001	—	—
Age 19 and younger (vs. 25 to 29)	-0.710364241	<0.0001	age_years ≤ 19	—
Age 20 to 24 (vs. 25 to 29)	-0.214817216	<0.0001	20 ≤ age_years ≤ 24	—
Age 30 to 34 (vs. 25 to 29)	0.213065275	<0.0001	30 ≤ age_years ≤ 34	—
Age 35 to 39 (vs. 25 to 29)	0.504232243	<0.0001	35 ≤ age_years ≤ 39	—
Age 40 and older (vs. 25 to 29)	0.726899952	<0.0001	age_years ≥ 40	—

Note

— Not applicable.

11 Repeat Hospital Stays for Mental Health and Substance Use

Risk factor	Regression coefficient	Pr > ChiSq (Wald)	ICD-10-CA codes; DSM-IV codes
Intercept	-2.029219993	<0.0001	—
Male (vs. female)	-0.041877254	<0.0001	—
Age 0 to 14 (vs. 25 to 44)	-0.614707817	<0.0001	—
Age 15 to 17 (vs. 25 to 44)	-0.151867012	<0.0001	—
Age 18 to 24 (vs. 25 to 44)	-0.134169102	<0.0001	—
Age 45 to 64 (vs. 25 to 44)	-0.168223861	<0.0001	—
Age 65 and older (vs. 25 to 44)	-0.624429674	<0.0001	—
Discharged against medical advice	0.183222058	<0.0001	—
Substance abuse–related disorder (vs. mood disorders)	0.424644836	<0.0001	Refer to the Methodology Notes for details
Schizophrenia (vs. mood disorders)	0.650444398	<0.0001	Refer to the Methodology Notes for details
Anxiety disorder (vs. mood disorders)	-0.442157093	<0.0001	Refer to the Methodology Notes for details
Personality disorder (vs. mood disorders)	0.820313226	<0.0001	Refer to the Methodology Notes for details
Other disorder (vs. mood disorders)	-0.351923296	<0.0001	—
Psychiatric hospital (vs. general hospital)	0.102883177	<0.0001	—

Note

— Not applicable.

12 30-Day Readmission for Mental Health and Substance Use

Mental illness category	Risk factor	Regression coefficient	Pr > ChiSq (Wald)
Substance abuse–related disorder (Refer to the Methodology Notes for details.)	Intercept	-2.174638757	<0.0001
	Male (vs. female)	0.050632	0.0022
	Age 0 to 14 (vs. 25 to 44)	-0.465272799	0.0043
	Age 15 to 17 (vs. 25 to 44)	-0.23804373	0.0002
	Age 18 to 24 (vs. 25 to 44)	0.098592386	0.0001
	Age 45 to 64 (vs. 25 to 44)	-0.15218745	<0.0001
	Age 65 and older (vs. 25 to 44)	-0.469527086	<0.0001
	2 or more previous admissions for any mental illness during the past 12 months	1.294474342	<0.0001
	Discharged against medical advice	0.567601897	<0.0001
	Psychiatric hospital (vs. general hospital)	-0.350725439	<0.0001
Schizophrenia (Refer to the Methodology Notes for details.)	Intercept	-1.8843839	<0.0001
	Male (vs. female)	0.010198482	0.5509
	Age 0 to 14 (vs. 25 to 44)	-0.054317937	0.6924
	Age 15 to 17 (vs. 25 to 44)	-0.045848738	0.4575
	Age 18 to 24 (vs. 25 to 44)	0.086653072	0.0001
	Age 45 to 64 (vs. 25 to 44)	-0.245917348	<0.0001
	Age 65 and older (vs. 25 to 44)	-0.569440587	<0.0001
	2 or more previous admissions for any mental illness during the past 12 months	0.81021782	<0.0001
	Discharged against medical advice	1.075679959	<0.0001
	Psychiatric hospital (vs. general hospital)	-0.222197783	<0.0001
Mood disorders (Refer to the Methodology Notes for details.)	Intercept	-2.100467333	<0.0001
	Male (vs. female)	0.013037053	0.4547
	Age 0 to 14 (vs. 25 to 44)	-0.195047695	<0.0001
	Age 15 to 17 (vs. 25 to 44)	-0.368237276	<0.0001
	Age 18 to 24 (vs. 25 to 44)	-0.121513558	<0.0001
	Age 45 to 64 (vs. 25 to 44)	-0.173624026	<0.0001
	Age 65 and older (vs. 25 to 44)	-0.350390162	<0.0001
	2 or more previous admissions for any mental illness during the past 12 months	1.105548086	<0.0001
	Discharged against medical advice	0.777382597	<0.0001
	Psychiatric hospital (vs. general hospital)	-0.124974709	<0.0001

Mental illness category	Risk factor	Regression coefficient	Pr > ChiSq (Wald)
Anxiety disorder (Refer to the Methodology Notes for details.)	Intercept	-2.15835167	<0.0001
	Male (vs. female)	-0.046558185	0.3263
	Age 0 to 14 (vs. 25 to 44)	-0.160266789	0.0500
	Age 15 to 17 (vs. 25 to 44)	-0.341630704	<0.0001
	Age 18 to 24 (vs. 25 to 44)	-0.294638347	0.0001
	Age 45 to 64 (vs. 25 to 44)	-0.038976075	0.5532
	Age 65 and older (vs. 25 to 44)	-0.286435652	0.0001
	2 or more previous admissions for any mental illness during the past 12 months	1.312865151	<0.0001
	Discharged against medical advice	0.783600402	<0.0001
	Psychiatric hospital (vs. general hospital)	-0.221078336	0.0239
Personality disorder (Refer to the Methodology Notes for details.)	Intercept	-1.863538137	<0.0001
	Male (vs. female)	-0.277263085	<0.0001
	Age 0 to 14 (vs. 25 to 44)	-0.262242036	0.0267
	Age 15 to 17 (vs. 25 to 44)	-0.476852497	<0.0001
	Age 18 to 24 (vs. 25 to 44)	-0.047829292	0.1560
	Age 45 to 64 (vs. 25 to 44)	-0.221339434	<0.0001
	Age 65 and older (vs. 25 to 44)	-0.4964295	<0.0001
	2 or more previous admissions for any mental illness during the past 12 months	1.521754366	<0.0001
	Discharged against medical advice	0.443687912	<0.0001
	Psychiatric hospital (vs. general hospital)	-0.171198182	<0.0001
Other disorder (Refer to the Methodology Notes for details.)	Intercept	-2.528040027	<0.0001
	Male (vs. female)	-0.105665479	<0.0001
	Age 0 to 14 (vs. 25 to 44)	-0.281723099	<0.0001
	Age 15 to 17 (vs. 25 to 44)	-0.024346345	0.5045
	Age 18 to 24 (vs. 25 to 44)	0.011795229	0.7347
	Age 45 to 64 (vs. 25 to 44)	-0.110385265	0.0021
	Age 65 and older (vs. 25 to 44)	-0.501877251	<0.0001
	2 or more previous admissions for any mental illness during the past 12 months	1.61523223	<0.0001
	Discharged against medical advice	0.735806099	<0.0001
	Psychiatric hospital (vs. general hospital)	-0.121917572	0.0034

Note

— Not applicable.

13 30-Day Acute Myocardial Infarction (AMI) In-Hospital Mortality

Risk factor	Regression coefficient	Pr > ChiSq (Wald)	ICD-10-CA codes	Qualifier
Intercept	-4.449043643	<0.0001	—	—
Male (vs. female)	-0.099625495	<0.0001	—	—
Age 18 to 44 (vs. 45 to 64)	-0.699564719	<0.0001	—	—
Age 65 to 74 (vs. 45 to 64)	0.738992797	<0.0001	—	—
Age 75 to 84 (vs. 45 to 64)	1.448709334	<0.0001	—	—
Age 85 and older (vs. 45 to 64)	2.224054509	<0.0001	—	—
Charlson Index score of 1 or 2 (vs. 0) (modified for Quebec records)*	0.382838951	<0.0001	Please refer to General Methodology Notes for details	
Charlson Index score of 3 or more (vs. 0) (modified for Quebec records)*	0.715291376	<0.0001	Please refer to General Methodology Notes for details	
Shock	2.626816284	<0.0001	R57	Type (1), (C) or [(W), (X) or (Y) but not (2)]
Any diabetes	-0.095546226	0.0026	E10, E11, E13, E14	Type (1), (C), (3) or [(W), (X) or (Y) but not (2)]
Heart failure (non-Quebec records)*	0.196953383	0.0000	I50	Type (1) or [(W), (X) or (Y) but not (2)]
Heart failure (Quebec records)*	0.205353612	0.0001	I50	Type (C) or [(W), (X) or (Y) but not (2)]
Cancer (non-Quebec records)*	0.404464188	0.0004	C00–C97	Type (1) or [(W), (X) or (Y) but not (2)]
Cancer (Quebec records)*	0.137915246	0.0961	C00–C97	Type (C) or [(W), (X) or (Y) but not (2)]
Cerebrovascular disease (non-Quebec records)*	0.981998726	0.0000	I60, I61, I62, I63, I64, I65, I66, I67, I69, G45	Type (1) or [(W), (X) or (Y) but not (2)]
Cerebrovascular disease (Quebec records)*	0.193489598	0.0514	I60, I61, I62, I63, I64, I65, I66, I67, I69, G45	Type (C) or [(W), (X) or (Y) but not (2)]
Renal failure (non-Quebec records)*	0.843499378	<0.0001	N17, N18, N19	Type (1) or [(W), (X) or (Y) but not (2)]
Renal failure (Quebec records)*	0.444352754	<0.0001	N17, N18, N19	Type (C) or [(W), (X) or (Y) but not (2)]
Pneumonia	0.557181232	<0.0001	J12–J16, J18	Type (1), (C) or [(W), (X) or (Y) but not (2)]
Cardiac arrest	2.347075946	<0.0001	I460, I469	Type (1), (C) or [(W), (X) or (Y) but not (2)]

Risk factor	Regression coefficient	Pr > ChiSq (Wald)	ICD-10-CA codes	Qualifier
STEMI	0.230190096	0.0000	R9430	Type (1), (C) or [(W), (X) or (Y) but not (2)]
COVID-19	0.810289741	0.0000	U071, U072	Type (M), (1), (C), (2), (W), (X) or (Y)

Notes

* This risk factor has 2 coefficients — 1 for the data submitted by Quebec and 1 for all other jurisdictions. Quebec-specific coefficients were included in the model to address differences in data collection.

— Not applicable.

14 30-Day Stroke In-Hospital Mortality

Risk factor	Regression coefficient	Pr > ChiSq (Wald)	ICD-10-CA codes	Qualifier
Intercept	-2.423927054	<0.0001	—	—
Male (vs. female)	-0.02168539	0.2728	—	—
Age 18 to 44 (vs. 75 to 84)	-1.069762703	<0.0001	—	—
Age 45 to 64 (vs. 75 to 84)	-0.663015174	<0.0001	—	—
Age 65 to 74 (vs. 75 to 84)	-0.371769196	<0.0001	—	—
Age 85 and older (vs. 75 to 84)	0.536539171	<0.0001	—	—
Heart failure	0.537301425	<0.0001	I50	Type (1), (C) or [(W), (X) or (Y) but not (2)]
Cancer	0.694628322	<0.0001	C00–C97	Type (1), (C) or [(W), (X) or (Y) but not (2)]
Renal failure (non-Quebec records)*	0.436351224	<0.0001	N17, N18, N19	Type (1) or [(W), (X) or (Y) but not (2)]
Renal failure (Quebec records)*	0.278725413	<0.0001	N17, N18, N19	Type (C) or [(W), (X) or (Y) but not (2)]
Ischemic heart disease (acute)	0.769242453	<0.0001	I20, I21, I22, I24	Type (1) or [(W), (X) or (Y) but not (2)]
Intracerebral hemorrhage (vs. ischemic stroke)	1.548841044	<0.0001	I61, I62.9 (applies only to years prior to 2015–2016)	Refer to the Methodology Notes for details
Stroke, not specified as hemorrhage or infarction (vs. ischemic stroke)	0.351646239	<0.0001	I64	Refer to the Methodology Notes for details
Subarachnoid hemorrhage (vs. ischemic stroke)	1.375963437	<0.0001	I60	Refer to the Methodology Notes for details
Venous sinus/cortical vein thrombosis (vs. ischemic stroke)	-0.430861982	0.0605	I63.6, I67.6, G08	Refer to the Methodology Notes for details
COVID-19	0.287338562	0.0318	U07.1, U07.2	Type (M), (1), (C), (2), (W), (X) or (Y)

Notes

* This risk factor has 2 coefficients — 1 for the data submitted by Quebec and 1 for all other jurisdictions. Quebec-specific coefficients were included in the model to address differences in data collection.

— Not applicable.

15 30-Day Acute Myocardial Infarction Readmission

Risk factor	Regression coefficient	Pr > ChiSq (Wald)	ICD-10-CA codes	Qualifier
Intercept	-2.872763873	<0.0001	—	—
Male (vs. female)	-0.127786392	<0.0001	—	—
Age 18 to 44 (vs. 45 to 64)	-0.158823529	0.0138	—	—
Age 65 to 74 (vs. 45 to 64)	0.283295334	<0.0001	—	—
Age 75 to 84 (vs. 45 to 64)	0.518533413	<0.0001	—	—
Age 85 and older (vs. 45 to 64)	0.748299943	<0.0001	—	—
Charlson Index score of 1 or 2 (vs. 0) (modified for Quebec records)*	0.31426097	<0.0001	Please refer to General Methodology Notes for details	
Charlson Index score of 3 or more (vs. 0) (modified for Quebec records)*	0.475426548	<0.0001	Please refer to General Methodology Notes for details	
1 acute care hospitalization in previous 6 months (vs. none)	0.7288375	<0.0001	—	—
COPD	0.205380432	<0.0001	J41, J42, J43, J44, J47	Type (1), (C) or [(W), (X) or (Y) but not (2)]
Renal failure	0.355235361	<0.0001	N17, N18, N19	Type (1), (C) or [(W), (X) or (Y) but not (2)]
Any diabetes	0.141100257	<0.0001	E10, E11, E13, E14	Type (1), (C), (3) or [(W), (X) or (Y) but not (2)]
Heart failure	0.236694356	<0.0001	I50	Type (C) or [(W), (X) or (Y) but not (2)]
Dementia	-0.103352909	0.0860	F01, F02, F03, F051, G30, G311	Type (1), (C) or [(W), (X) or (Y) but not (2)]
Cancer	0.217909489	0.0002	C00–C97	Type (1), (C) or [(W), (X) or (Y) but not (2)]
Arrhythmia	0.187254983	<0.0001	I47, I48, I49	Type (1), (C) or [(W), (X) or (Y) but not (2)]
Shock	0.341776122	<0.0001	R57	Type (1), (C) or [(W), (X) or (Y) but not (2)]
STEMI	0.056366046	0.0860	R9430	Type (1), (C) or [(W), (X) or (Y) but not (2)]

Note

— Not applicable.

16 High Users of Hospital Beds

Risk factor	Regression coefficient	Pr > ChiSq (Wald)
Intercept	-4.055083906	<0.0001
Age 25 to 49 (vs. 18 to 24)	0.217177052	<0.0001
Age 50 to 64 (vs. 18 to 24)	0.589621811	<0.0001
Age 65 and older (vs. 18 to 24)	0.89669014	<0.0001
Male (vs. female)	0.040619089	<0.0001
Urgent admission	0.739832881	<0.0001
Mental illness (vs. medical)*	0.536429053	<0.0001
Obstetric (vs. medical)*	-3.300506002	<0.0001
Palliative care (vs. medical)*	0.851597113	<0.0001
Surgical (vs. medical)*	-0.728578554	<0.0001

Note

* Refer to the [Methodology Notes](#) for details.



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