

Methodology Used to Risk-Adjust Data

WHA Information Center, LLC (WHAIC) uses computer software (3M™ Core Grouping Software which includes 3M™ APR- DRG Software) to assign the APR-DRG to each hospitalization.

The APR-DRGs are an expansion of DRGs, a patient classification system used by the Centers for Medicare and Medicaid Services to relate hospital case mix to cost, or hospital resources consumed. The APR-DRGs were developed in response to the demand for a patient classification system with applicability beyond assessments of resource use - one that can be used to evaluate differences in outcomes such as inpatient mortality.

APR-DRGs expand basic DRGs through the addition of four subclasses that address distinct patient attributes related to severity of illness and risk of mortality.

Severity of illness denotes the extent of physiologic de-compensation or organ-system loss of function experienced by the patient, while risk of mortality refers to the likelihood of dying. The four severity-of-illness subclasses and four risk-of-mortality subclasses denote minor, moderate, major and extreme severity of illness and risk of mortality. Patients with the highest severity of illness and/or risk of mortality are characterized by the presence of multiple serious diseases.¹

Assignment to APR-DRG severity-of-illness and risk-of-mortality subclasses takes into consideration principal diagnosis, secondary diagnoses and their combinations (comorbidities), patient age and sex, and the presence of certain OR (operating room) and non-OR procedures.

The 3M™ Core Grouping Software uses patient attributes to calculate a severity-of-illness score and a risk-of-mortality score for each relevant patient data record in a hospital inpatient data file. These scores are added to the record and are used as variables in the calculation of risk-adjusted mortality and utilization rates for hospitals.

To calculate the risk adjusted value the following methodology was used. The Actual Average Charge for each APR-DRG statewide is calculated using the four severity-of-illness levels. Then the Actual Average Charge and the Expected Average Charge are calculated using the four severity-of-illness levels for each APR-DRG for three groups; 1) each hospital, 2) each Analysis Area, and 3) each Volume Group. Then the Actual Average value for each APR-DRG for each of the three groups is divided by the Expected Average Charge for that APR-DRG/group, then multiplied by the Statewide Actual Average Charge for that APR-DRG. This produces a Risk Adjusted Charge for each of the APR-DRG/groups.

Comparison of these values will point out variations due to factors other than differences in patient risk. Groups of patients, such as those in different hospitals, may be compared as if they were all like the average patient in their APR-DRG.

Technical Notes

The total for Firearms, Assault in Table 13 differs from the total for Firearms & Explosives in Table 24 because Table 13 includes all Assaults by Firearms including those that were due to Legal Intervention (police action). Table 24 includes Assaults by Firearms excluding those that were due to Legal Intervention and also includes Assaults by Explosion.

¹ Averill RF, et al.. Development of the All Patient Refined DRGs (APR-DRGs). 3M Health Information Systems Research Report. 1997.

U.S. Census Population

Population rates throughout this report were calculated from U.S. Census Bureau Information.

Table 1: PEPANNRES 2021 Population Estimates for Wisconsin Counties

Source: Population Division, U.S. Census Bureau <https://data.census.gov>

Release Date: May 2022

County	Analysis Area Code	Analysis Area Description	Population Census	Analysis Area Total
Columbia	1	Southern	58,490	
Dane	1	Southern	561,504	
Dodge	1	Southern	89,396	
Grant	1	Southern	51,938	
Green	1	Southern	37,093	
Iowa	1	Southern	23,709	
Jefferson	1	Southern	84,900	
Lafayette	1	Southern	16,611	
Richland	1	Southern	17,304	
Rock	1	Southern	163,687	
Sauk	1	Southern	65,763	
		Southern		1,170,395
Kenosha	2A	Southeastern	169,151	
Ozaukee	2A	Southeastern	91,503	
Racine	2A	Southeastern	197,727	
Walworth	2A	Southeastern	106,478	
Washington	2A	Southeastern	136,761	
Waukesha	2A	Southeastern	406,978	
		Southeastern		1,108,598
Milwaukee	2B	Milwaukee County	939,489	
		Milwaukee County		939,489
Calumet	3	Lake Winnebago	52,442	
Fond du Lac	3	Lake Winnebago	104,154	
Green Lake	3	Lake Winnebago	19,018	
Marquette	3	Lake Winnebago	15,592	
Outagamie	3	Lake Winnebago	190,705	
Waupaca	3	Lake Winnebago	51,812	
Waushara	3	Lake Winnebago	24,520	
Winnebago	3	Lake Winnebago	171,730	
		Lake Winnebago		629,973
Brown	4	Northeastern	268,740	
Door	4	Northeastern	30,066	
Kewaunee	4	Northeastern	20,563	
Manitowoc	4	Northeastern	81,359	
Marinette	4	Northeastern	41,872	
Menominee	4	Northeastern	4,255	
Oconto	4	Northeastern	38,965	
Shawano	4	Northeastern	40,881	
Sheboygan	4	Northeastern	118,034	
		Northeastern		644,735

County	Analysis Area Code	Analysis Area Description	Population Census	Analysis Area Total
Barron	5A	West Central	46,711	
Chippewa	5A	West Central	66,297	
Clark	5A	West Central	34,659	
Dunn	5A	West Central	45,440	
Eau Claire	5A	West Central	105,710	
Pepin	5A	West Central	7,318	
Pierce	5A	West Central	42,212	
Polk	5A	West Central	44,977	
Rusk	5A	West Central	14,188	
St. Croix	5A	West Central	93,536	
		West Central		501,048
Buffalo	5B	Southwestern	13,317	
Crawford	5B	Southwestern	16,113	
Jackson	5B	Southwestern	21,145	
La Crosse	5B	Southwestern	120,784	
Monroe	5B	Southwestern	46,274	
Trempealeau	5B	Southwestern	30,760	
Vernon	5B	Southwestern	30,714	
		Southwestern		279,107
Adams	6	North Central	20,654	
Florence	6	North Central	4,558	
Forest	6	North Central	9,179	
Juneau	6	North Central	26,718	
Langlade	6	North Central	19,491	
Lincoln	6	North Central	28,415	
Marathon	6	North Central	138,013	
Oneida	6	North Central	37,845	
Portage	6	North Central	70,377	
Taylor	6	North Central	19,913	
Vilas	6	North Central	23,047	
Wood	6	North Central	74,207	
		North Central		472,417
Ashland	7	Western Lake Superior	16,027	
Bayfield	7	Western Lake Superior	16,220	
Burnett	7	Western Lake Superior	16,526	
Douglas	7	Western Lake Superior	44,295	
Iron	7	Western Lake Superior	6,137	
Price	7	Western Lake Superior	14,054	
Sawyer	7	Western Lake Superior	18,074	
Washburn	7	Western Lake Superior	16,623	
		Western Lake Superior		147,956
			5,893,718	5,893,718

Table 2: PEPAGESEX 2021 Age/Sex Population Estimates for Wisconsin
 Source: Population Division, U.S. Census Bureau <https://data.census.gov>
 Release Date: June 2022

Both Sexes				
Age Group	Population Estimate	Inpatient Age Group Total	Ambulatory Surgery Data Age Group Total	Emergency Department Data Age Group Total
Under 5 years	331,066			
5 to 9 years	350,727			
10 to 14 years	368,898	1,050,691	1,050,691	1,050,691
15 to 19 years	377,618	377,618		
20 to 24 years	396,548	396,548		774,166
25 to 29 years	371,411			
30 to 34 years	364,148	735,559		
35 to 39 years	371,790			
40 to 44 years	334,353	706,143	2,215,868	1,441,702
45 to 49 years	350,967			
50 to 54 years	387,482	738,449		
55 to 59 years	429,759			
60 to 64 years	389,409	819,168	1,557,617	1,557,617
65 to 69 years	327,383			
70 to 74 years	246,354	573,737		573,737
75 to 79 years	160,337			
80 to 84 years	115,496	275,833		
85 years and over	133,229	133,229	982,799	409,062
	5,806,975	5,806,975	5,806,975	5,806,975

Male				
Age Group	Population Estimate	Inpatient Age Group Total	Ambulatory Surgery Data Age Group Total	Emergency Department Data Age Group Total
Under 5 years	169,682			
5 to 9 years	178,837			
10 to 14 years	189,763	538,282	538,282	538,282
15 to 19 years	192,331	192,331		
20 to 24 years	202,126	202,126		394,457
25 to 29 years	191,322			
30 to 34 years	185,214	376,536		
35 to 39 years	189,125			
40 to 44 years	168,078	357,203	1,128,196	733,739
45 to 49 years	176,608			
50 to 54 years	193,509	370,117		
55 to 59 years	211,582			
60 to 64 years	193,470	405,052	775,169	775,169
65 to 69 years	160,892			
70 to 74 years	117,053	277,945		277,945
75 to 79 years	73,891			
80 to 84 years	49,768	123,659		
85 years and over	46,532	46,532	448,136	170,191
	2,889,783	2,889,783	2,889,783	2,889,783

Female				
Age Group	Population Estimate	Inpatient Age Group Total	Ambulatory Surgery Data Age Group Total	Emergency Department Data Age Group Total
Under 5 years	161,384			
5 to 9 years	171,890			
10 to 14 years	179,135	512,409	512,409	512,409
15 to 19 years	185,287	185,287		
20 to 24 years	194,422	194,422		379,709
25 to 29 years	180,089			
30 to 34 years	178,934	359,023		
35 to 39 years	182,665			
40 to 44 years	166,275	348,940	1,087,672	707,963
45 to 49 years	174,359			
50 to 54 years	193,973	368,332		
55 to 59 years	218,177			
60 to 64 years	195,939	414,116	782,448	782,448
65 to 69 years	166,491			
70 to 74 years	129,301	295,792		295,792
75 to 79 years	86,446			
80 to 84 years	65,728	152,174		
85 years and over	86,697	86,697	534,663	238,871
	2,917,192	2,917,192	2,917,192	2,917,192

External Cause Code Category Assignment

Categories and subcategories were assigned in the following manner:

1. The code ranges used in prior years were evaluated for additions, changes and deletions.
2. The descriptions of the external cause codes currently in use were scrutinized at the category grouping levels to verify accurate grouping.
3. Subcategories were assigned to delineate the differences in intent: Accidental, Self-Inflicted, Assault, or Undetermined.
4. Category assignment of external cause codes fell into the following categories/subcategories for purposes of this report:

Category	Subcategory
Assault, not elsewhere classified	Assault
Caught/Crush, not elsewhere classified	Accidental
Cut/Pierce	Accidental Self-Inflicted Assault Undetermined
Drown/Submersion	Accidental Self-Inflicted Assault Undetermined
Electric Current	Accidental Undetermined
Explosion	Accidental Self-Inflicted Assault
Falls	Accidental Self-Inflicted Assault Undetermined
Fire/Flames	Accidental Self-inflicted Assault Undetermined
Firearms	Accidental Self-Inflicted Assault Undetermined
Hot Objects/Scalds	Accidental Self-Inflicted Assault Undetermined
Jumping	Undetermined
Legal Intervention	Legal
Machinery	Accidental

Category	Subcategory
Motor Vehicle Traffic	Accidental Self-Inflicted Assault Undetermined
Natural/Environmental	Accidental Self-Inflicted Undetermined
Other Motor Vehicle Non-traffic	Accidental
Other Pedal Cycle	Accidental
Other Transport	Accidental Self-inflicted Undetermined
Other Injury, not elsewhere classified	Undetermined
Overexertion	Accidental
Poisoning	Accidental Self-Inflicted Assault Undetermined
Radiation	Accidental
Self-Inflicted, not elsewhere classified	Self-Inflicted
Striking/Struck by	Accidental Assault
Terrorism	Terrorism
War	War

Diagnostic Category Assignment – Rehabilitation Services

Source: Department of Health & Human Services (DHHS), Centers for Medicare & Medicaid Services (CMS).

<https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/InpatientRehabFacPPS/index.html>