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: CO-EST2022-POP-55 2022 Population Estimates for Wisconsin Counties
Source: Population Division, U.S. Census Bureau https://www.census.gov
Release Date: June 2023

County	Analysis Area Code	Analysis Area Description	Population Census	Analysis Area Total
Columbia	1	Southern	58,193	
Dane	1	Southern	568,203	
Dodge	1	Southern	88,282	
Grant	1	Southern	51,276	
Green	1	Southern	36,816	
Iowa	1	Southern	23,865	
Jefferson	1	Southern	85,784	
Lafayette	1	Southern	16,877	
Richland	1	Southern	17,090	
Rock	1	Southern	164,060	
Sauk	1	Southern	65,777	
		Southern		**1,176,223**
Kenosha	2A	Southeastern	167,817	
Ozaukee	2A	Southeastern	93,009	
Racine	2A	Southeastern	195,846	
Walworth	2A	Southeastern	105,380	
Washington	2A	Southeastern	137,688	
Waukesha	2A	Southeastern	410,434	
		Southeastern		**1,110,174**
Milwaukee	2B	Milwaukee County	918,661	
		Milwaukee County		**918,661**
Calumet	3	Lake Winnebago	52,718	
Fond du Lac	3	Lake Winnebago	103,836	
Green Lake	3	Lake Winnebago	19,220	
Marquette	3	Lake Winnebago	15,779	
Outagamie	3	Lake Winnebago	192,127	
Waupaca	3	Lake Winnebago	51,488	
Waushara	3	Lake Winnebago	24,999	
Winnebago	3	Lake Winnebago	170,718	
		Lake Winnebago		**630,885**
Brown	4	Northeastern	270,036	
Door	4	Northeastern	30,526	
Kewaunee	4	Northeastern	20,623	
Manitowoc	4	Northeastern	81,172	
Marinette	4	Northeastern	41,988	
Menominee	4	Northeastern	4,197	
Oconto	4	Northeastern	39,633	
Shawano	4	Northeastern	40,886	
Sheboygan	4	Northeastern	117,841	
		Northeastern		**646,902**

County	Analysis Area Code	Analysis Area Description	Population Census	Analysis Area Total
Barron	5A	West Central	46,843	
Chippewa	5A	West Central	66,807	
Clark	5A	West Central	34,691	
Dunn	5A	West Central	45,651	
Eau Claire	5A	West Central	106,837	
Pepin	5A	West Central	7,410	
Pierce	5A	West Central	42,532	
Polk	5A	West Central	45,709	
Rusk	5A	West Central	14,186	
St. Croix	5A	West Central	96,017	
		West Central		**506,683**
Buffalo	5B	Southwestern	13,391	
Crawford	5B	Southwestern	16,007	
Jackson	5B	Southwestern	20,836	
La Crosse	5B	Southwestern	120,294	
Monroe	5B	Southwestern	46,109	
Trempealeau	5B	Southwestern	30,899	
Vernon	5B	Southwestern	31,060	
		Southwestern		**278,596**
Adams	6	North Central	21,226	
Florence	6	North Central	4,688	
Forest	6	North Central	9,381	
Juneau	6	North Central	26,866	
Langlade	6	North Central	19,559	
Lincoln	6	North Central	28,376	
Marathon	6	North Central	137,958	
Oneida	6	North Central	38,212	
Portage	6	North Central	70,718	
Taylor	6	North Central	19,975	
Vilas	6	North Central	23,763	
Wood	6	North Central	73,993	
		North Central		**474,715**
Ashland	7	Western Lake Superior	16,039	
Bayfield	7	Western Lake Superior	16,608	
Burnett	7	Western Lake Superior	17,036	
Douglas	7	Western Lake Superior	44,144	
Iron	7	Western Lake Superior	6,224	
Price	7	Western Lake Superior	14,179	
Sawyer	7	Western Lake Superior	18,559	
Washburn	7	Western Lake Superior	16,911	
		Western Lake Superior		**149,700**
			5,892,539	**5,892,539**

Table 2:   CC-EST2022-AGESEX-55 2022 Age/Sex Population Estimates for Wisconsin
Source: Population Division, U.S. Census Bureau https://www.census.gov
Release Date: June 2023

Both Sexes Age Group	Population Estimate	Inpatient Age Group Total	Ambulatory Surgery Data Age Group Total	Emergemcy Department Data Age Group Total
Under 5 years	312,622			
5 to 9 years	339,916			
10 to 14 years	363,289	1,015,827	1,015,827	1,015,827
15 to 19 years	383,560	383,560		
20 to 24 years	411,840	411,840		795,400
25 to 29 years	367,885			
30 to 34 years	365,650	733,535		
35 to 39 years	372,740			
40 to 44 years	370,650	743,390	2,272,325	1,476,925
45 to 49 years	329,307			
50 to 54 years	360,298	689,605		
55 to 59 years	395,560			
60 to 64 years	417,103	812,663	1,502,268	1,502,268
65 to 69 years	366,203			
70 to 74 years	292,423	658,626		658,626
75 to 79 years	198,304			
80 to 84 years	122,730	321,034		
85 years and over	122,459	122,459	1,102,119	443,493
	5,892,539	5,892,539	5,892,539	5,892,539

Male Age Group	Population Estimate	Inpatient Age Group Total	Ambulatory Surgery Data Age Group Total	Emergemcy Department Data Age Group Total
Under 5 years	159,789			
5 to 9 years	173,912			
10 to 14 years	186,810	520,511	520,511	520,511
15 to 19 years	196,448	196,448		
20 to 24 years	209,667	209,667		406,115
25 to 29 years	190,269			
30 to 34 years	187,709	377,978		
35 to 39 years	190,184			
40 to 44 years	189,964	380,148	1,164,241	758,126
45 to 49 years	168,305			
50 to 54 years	184,213	352,518		
55 to 59 years	198,701			
60 to 64 years	208,021	406,722	759,240	759,240
65 to 69 years	180,834			
70 to 74 years	141,711	322,545		322,545
75 to 79 years	92,951			
80 to 84 years	53,065	146,016		
85 years and over	42,753	42,753	511,314	188,769
	2,955,306	2,955,306	2,955,306	2,955,306

Female Age Group	Population Estimate	Inpatient Age Group Total	Ambulatory Surgery Data Age Group Total	Emergemcy Department Data Age Group Total
Under 5 years	152,833			
5 to 9 years	166,004			
10 to 14 years	176,479	495,316	495,316	495,316
15 to 19 years	187,112	187,112		
20 to 24 years	202,173	202,173		389,285
25 to 29 years	177,616			
30 to 34 years	177,941	355,557		
35 to 39 years	182,556			
40 to 44 years	180,686	363,242	1,108,084	718,799
45 to 49 years	161,002			
50 to 54 years	176,085	337,087		
55 to 59 years	196,859			
60 to 64 years	209,082	405,941	743,028	743,028
65 to 69 years	185,369			
70 to 74 years	150,712	336,081		336,081
75 to 79 years	105,353			
80 to 84 years	69,665	175,018		
85 years and over	79,706	79,706	590,805	254,724
	2,937,233	2,937,233	2,937,233	2,937,233

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