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 2017 Population Estimates for Wisconsin Counties
Source: Population Division, U.S. Census Bureau http://www.census.gov
Release Date: May 2018

County	Analysis Area Code	Analysis Area Description	Population Census	Analysis Area Total
Columbia	1	Southern	57,248	
Dane	1	Southern	536,416	
Dodge	1	Southern	87,786	
Grant	1	Southern	51,999	
Green	1	Southern	36,851	
Iowa	1	Southern	23,715	
Jefferson	1	Southern	84,832	
Lafayette	1	Southern	16,741	
Richland	1	Southern	17,516	
Rock	1	Southern	162,309	
Sauk	1	Southern	63,981	
		Southern		**1,139,394**
Kenosha	2A	Southeastern	168,521	
Ozaukee	2A	Southeastern	88,429	
Racine	2A	Southeastern	196,071	
Walworth	2A	Southeastern	103,082	
Washington	2A	Southeastern	135,101	
Waukesha	2A	Southeastern	400,621	
		Southeastern		**1,091,825**
Milwaukee	2B	Milwaukee County	952,085	
		Milwaukee County		**952,085**
Calumet	3	Lake Winnebago	50,067	
Fond du Lac	3	Lake Winnebago	102,548	
Green Lake	3	Lake Winnebago	18,760	
Marquette	3	Lake Winnebago	15,308	
Outagamie	3	Lake Winnebago	186,059	
Waupaca	3	Lake Winnebago	51,225	
Waushara	3	Lake Winnebago	24,369	
Winnebago	3	Lake Winnebago	170,414	
		Lake Winnebago		**618,750**
Brown	4	Northeastern	262,052	
Door	4	Northeastern	27,483	
Kewaunee	4	Northeastern	20,445	
Manitowoc	4	Northeastern	79,175	
Marinette	4	Northeastern	40,310	
Menominee	4	Northeastern	4,615	
Oconto	4	Northeastern	37,553	
Shawano	4	Northeastern	40,935	
Sheboygan	4	Northeastern	115,344	
		Northeastern		**627,912**

County	Analysis Area Code	Analysis Area Description	Population Census	Analysis Area Total
Barron	5A	West Central	45,251	
Chippewa	5A	West Central	63,813	
Clark	5A	West Central	34,679	
Dunn	5A	West Central	44,693	
Eau Claire	5A	West Central	103,671	
Pepin	5A	West Central	7,254	
Pierce	5A	West Central	41,901	
Polk	5A	West Central	43,450	
Rusk	5A	West Central	14,151	
St. Croix	5A	West Central	88,703	
		West Central		**487,566**
Buffalo	5B	Southwestern	13,167	
Crawford	5B	Southwestern	16,214	
Jackson	5B	Southwestern	20,529	
La Crosse	5B	Southwestern	118,274	
Monroe	5B	Southwestern	45,625	
Trempealeau	5B	Southwestern	29,472	
Vernon	5B	Southwestern	30,759	
		Southwestern		**274,040**
Adams	6	North Central	19,973	
Florence	6	North Central	4,371	
Forest	6	North Central	8,970	
Juneau	6	North Central	26,576	
Langlade	6	North Central	19,160	
Lincoln	6	North Central	27,838	
Marathon	6	North Central	135,732	
Oneida	6	North Central	35,254	
Portage	6	North Central	70,474	
Taylor	6	North Central	20,321	
Vilas	6	North Central	21,683	
Wood	6	North Central	73,126	
		North Central		**463,478**
Ashland	7	Western Lake Superior	15,500	
Bayfield	7	Western Lake Superior	15,008	
Burnett	7	Western Lake Superior	15,352	
Douglas	7	Western Lake Superior	43,284	
Iron	7	Western Lake Superior	5,671	
Price	7	Western Lake Superior	13,442	
Sawyer	7	Western Lake Superior	16,418	
Washburn	7	Western Lake Superior	15,758	
		Western Lake Superior		**140,433**
			5,795,483	**5,795,483**

Table 2:   PEPAGESEX 2017 Age/Sex Population Estimates for Wisconsin
Source: Population Division, U.S. Census Bureau http://www.census.gov
Release Date: June 2018

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	335,888			
5 to 9 years	353,389			
10 to 14 years	368,569	1,057,846	1,057,846	1,057,846
15 to 19 years	380,230	380,230		
20 to 24 years	401,781	401,781		782,011
25 to 29 years	365,520			
30 to 34 years	365,840	731,360		
35 to 39 years	365,703			
40 to 44 years	328,433	694,136	2,207,507	1,425,496
45 to 49 years	360,999			
50 to 54 years	399,236	760,235		
55 to 59 years	428,373			
60 to 64 years	386,965	815,338	1,575,573	1,575,573
65 to 69 years	321,017			
70 to 74 years	231,392	552,409		552,409
75 to 79 years	159,791			
80 to 84 years	113,509	273,300		
85 years and over	128,848	128,848	954,557	402,148
	5,795,483	5,795,483	5,795,483	5,795,483

Male Age Group	Population Estimate	Inpatient Age Group Total	Ambulatory Surgery Data Age Group Total	Emergemcy Department Data Age Group Total
Under 5 years	171,722			
5 to 9 years	180,862			
10 to 14 years	188,711	541,295	541,295	541,295
15 to 19 years	193,976	193,976		
20 to 24 years	204,039	204,039		398,015
25 to 29 years	188,944			
30 to 34 years	185,502	374,446		
35 to 39 years	185,235			
40 to 44 years	165,992	351,227	1,123,688	725,673
45 to 49 years	181,918			
50 to 54 years	198,942	380,860		
55 to 59 years	212,179			
60 to 64 years	191,153	403,332	784,192	784,192
65 to 69 years	157,231			
70 to 74 years	110,559	267,790		267,790
75 to 79 years	72,751			
80 to 84 years	48,471	121,222		
85 years and over	44,551	44,551	433,563	165,773
	2,882,738	2,882,738	2,882,738	2,882,738

Female

Age Group	Population Estimate	Inpatient Age Group Total	Ambulatory Surgery Data Age Group Total	Emergemcy Department Data Age Group Total
Under 5 years	164,166			
5 to 9 years	172,527			
10 to 14 years	179,858	516,551	516,551	516,551
15 to 19 years	186,254	186,254		
20 to 24 years	197,742	197,742		383,996
25 to 29 years	176,576			
30 to 34 years	180,338	356,914		
35 to 39 years	180,468			
40 to 44 years	162,441	342,909	1,083,819	699,823
45 to 49 years	179,081			
50 to 54 years	200,294	379,375		
55 to 59 years	216,194			
60 to 64 years	195,812	412,006	791,381	791,381
65 to 69 years	163,786			
70 to 74 years	120,833	284,619		284,619
75 to 79 years	87,040			
80 to 84 years	65,038	152,078		
85 years and over	84,297	84,297	520,994	236,375
	2,912,745	2,912,745	2,912,745	2,912,745

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

Payer Code Assignment

Payer Codes for the primary and secondary payers who are expected to pay for the inpatient stay, ambulatory surgery, or emergency department visit. Only primary payer codes are utilized for this report. The primary payer data element has a field length of 5 characters and consists of two components – the payer identifier and the payer type. The primary payer is required and compatibility between the payer identifier and the payer type components is verified.

Code Structure for Payer Identifier

Code	Description
MED/T18	Medicare
T19	Wisconsin Medical Assistance (Medicaid)
nnn/BCS	3-digit plan code – Non-Medicaid Blue Cross/Blue Shield
CHA	CHAMPUS or CHAMPVA
BGR	Badger Care
OTH	Payer not identified above

Code Structure for Payer Type for use with MED, T19, nnn (Blue Cross/Blue Shield), CHA, or BGR

Code	Description
01	Fee-for-service, non-HMO Medicare, or non-HMO Medicaid
02	Alternative Health Care Insurance Plans (HMO, PPO)
03	CHAMPUS or CHAMPVA
09	Unable to determine insurance type.

Code Structure for Payer Type for use with OTH

Code	Description
11	Commercial or private insurance - fee-for-service
12	Commercial or private insurance - alternative health care insurance plan (HMO/PPO)
19	Commercial or private insurance - unable to determine insurance type
21	Employer self-funded - fee-for-service
22	Employer self-funded - alternative health care insurance plan (HMO/PPO)
29	Employer self-funded - unable to determine insurance type
31	Other organization self-funded - fee-for-service
32	Other organization self-funded - alternative health care insurance plan (HMO/PPO)
39	Other organization self-funded - unable to determine insurance type
41	Workers' Compensation
51	Non-Wisconsin Medicaid
52	51.42/ 51.437/ 46.23 County Board
54	WisconCare
55	TRICARE (CHAMPUS) supplement
59	Other government agency or program
61	Self-pay
71	Research Grant
98	Other
99	Unknown

Primary payer data submitted are converted to payer groups prior to release of data, which are included in the purchased data rather than original data submitted. The following payer groups were utilized in this report for the inpatient data individual hospital tables:

Code Structure for Payer Code Assignment

Payer Identifier	Payer Type	Payer Group	Description
MED/T18	01	1	Medicare
MED/T18	02	1	Medicare
MED/T18	09	1	Medicare
BGR	01	2	Medicaid/BadgerCare
BGR	02	2	Medicaid/BadgerCare
BGR	09	2	Medicaid/BadgerCare
T19	01	2	Medicaid/BadgerCare
T19	02	2	Medicaid/BadgerCare
T19	09	2	Medicaid/BadgerCare
nnn[1]/BCS	01	4	Commercial or Private Insurance
nnn/BCS	02	4	Commercial or Private Insurance
nnn/BCS	09	4	Commercial or Private Insurance
OTH	11	4	Commercial or Private Insurance
OTH	12	4	Commercial or Private Insurance
OTH	19	4	Commercial or Private Insurance
OTH	21	4	Commercial or Private Insurance
OTH	22	4	Commercial or Private Insurance
OTH	29	4	Commercial or Private Insurance
OTH	31	4	Commercial or Private Insurance
OTH	32	4	Commercial or Private Insurance
OTH	39	4	Commercial or Private Insurance
OTH	41	4	Commercial or Private Insurance
CHA	03	3	Other Government
OTH	51	2	Medicaid, Other State
OTH	52	3	Other Government
OTH	54	3	Other Government
OTH	55	3	Other Government
OTH	56	3	Other Government
OTH	59	3	Other Government
OTH	61	5	Self-Pay
OTH	71	6	Other or Unknown
OTH	98	6	Other or Unknown
OTH	99	6	Other or Unknown

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[1] nnn represents Blue Cross/Blue Shield plan number

Diagnostic Category Assignment – Rehabilitation Services

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