**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 2018 Population Estimates for Wisconsin Counties
Source:      Population Division, U.S. Census Bureau http://www.census.gov
Release Date: May 2019

| County | Analysis Area Code | Analysis Area Description | Population Census | Analysis Area Total |
|---|---|---|---|---|
| Columbia | 1 | Southern | 57,358 | |
| Dane | 1 | Southern | 542,364 | |
| Dodge | 1 | Southern | 87,847 | |
| Grant | 1 | Southern | 51,554 | |
| Green | 1 | Southern | 36,929 | |
| Iowa | 1 | Southern | 23,771 | |
| Jefferson | 1 | Southern | 85,129 | |
| Lafayette | 1 | Southern | 16,665 | |
| Richland | 1 | Southern | 17,377 | |
| Rock | 1 | Southern | 163,129 | |
| Sauk | 1 | Southern | 64,249 | |
| | | **Southern** | | **1,146,372** |
| Kenosha | 2A | Southeastern | 169,290 | |
| Ozaukee | 2A | Southeastern | 89,147 | |
| Racine | 2A | Southeastern | 196,584 | |
| Walworth | 2A | Southeastern | 103,718 | |
| Washington | 2A | Southeastern | 135,693 | |
| Waukesha | 2A | Southeastern | 403,072 | |
| | | **Southeastern** | | **1,097,504** |
| Milwaukee | 2B | Milwaukee County | 948,201 | |
| | | **Milwaukee County** | | **948,201** |
| Calumet | 3 | Lake Winnebago | 50,159 | |
| Fond du Lac | 3 | Lake Winnebago | 103,066 | |
| Green Lake | 3 | Lake Winnebago | 18,918 | |
| Marquette | 3 | Lake Winnebago | 15,434 | |
| Outagamie | 3 | Lake Winnebago | 187,365 | |
| Waupaca | 3 | Lake Winnebago | 51,128 | |
| Waushara | 3 | Lake Winnebago | 24,263 | |
| Winnebago | 3 | Lake Winnebago | 171,020 | |
| | | **Lake Winnebago** | | **621,353** |
| Brown | 4 | Northeastern | 263,378 | |
| Door | 4 | Northeastern | 27,610 | |
| Kewaunee | 4 | Northeastern | 20,383 | |
| Manitowoc | 4 | Northeastern | 79,074 | |
| Marinette | 4 | Northeastern | 40,434 | |
| Menominee | 4 | Northeastern | 4,658 | |
| Oconto | 4 | Northeastern | 37,830 | |
| Shawano | 4 | Northeastern | 40,796 | |
| Sheboygan | 4 | Northeastern | 115,456 | |
| | | **Northeastern** | | **629,619** |

| County | Analysis Area Code | Analysis Area Description | Population Census | Analysis Area Total |
|---|---|---|---|---|
| Barron | 5A | West Central | 45,164 | |
| Chippewa | 5A | West Central | 64,135 | |
| Clark | 5A | West Central | 34,709 | |
| Dunn | 5A | West Central | 45,131 | |
| Eau Claire | 5A | West Central | 104,534 | |
| Pepin | 5A | West Central | 7,289 | |
| Pierce | 5A | West Central | 42,555 | |
| Polk | 5A | West Central | 43,598 | |
| Rusk | 5A | West Central | 14,147 | |
| St. Croix | 5A | West Central | 89,694 | |
| | | **West Central** | | **490,956** |
| Buffalo | 5B | Southwestern | 13,125 | |
| Crawford | 5B | Southwestern | 16,291 | |
| Jackson | 5B | Southwestern | 20,478 | |
| La Crosse | 5B | Southwestern | 118,230 | |
| Monroe | 5B | Southwestern | 46,051 | |
| Trempealeau | 5B | Southwestern | 29,442 | |
| Vernon | 5B | Southwestern | 30,785 | |
| | | **Southwestern** | | **274,402** |
| Adams | 6 | North Central | 20,348 | |
| Florence | 6 | North Central | 4,321 | |
| Forest | 6 | North Central | 8,991 | |
| Juneau | 6 | North Central | 26,617 | |
| Langlade | 6 | North Central | 19,268 | |
| Lincoln | 6 | North Central | 27,689 | |
| Marathon | 6 | North Central | 135,428 | |
| Oneida | 6 | North Central | 35,470 | |
| Portage | 6 | North Central | 70,942 | |
| Taylor | 6 | North Central | 20,412 | |
| Vilas | 6 | North Central | 21,938 | |
| Wood | 6 | North Central | 73,055 | |
| | | **North Central** | | **464,479** |
| Ashland | 7 | Western Lake Superior | 15,600 | |
| Bayfield | 7 | Western Lake Superior | 15,042 | |
| Burnett | 7 | Western Lake Superior | 15,392 | |
| Douglas | 7 | Western Lake Superior | 43,208 | |
| Iron | 7 | Western Lake Superior | 5,676 | |
| Price | 7 | Western Lake Superior | 13,397 | |
| Sawyer | 7 | Western Lake Superior | 16,489 | |
| Washburn | 7 | Western Lake Superior | 15,878 | |
| | | **Western Lake Superior** | | **140,682** |
| | | | **5,813,568** | **5,813,568** |

Table 2:　　　PEPAGESEX 2018 Age/Sex Population Estimates for Wisconsin
Source:　　　 Population Division, U.S. Census Bureau http://www.census.gov
Release Date: June 2019

| 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 | 334,382 | | | |
| 5 to 9 years | 349,799 | | | |
| 10 to 14 years | 369,348 | 1,053,529 | 1,053,529 | 1,053,529 |
| 15 to 19 years | 378,418 | 378,418 | | |
| 20 to 24 years | 395,921 | 395,921 | | 774,339 |
| 25 to 29 years | 374,435 | | | |
| 30 to 34 years | 362,942 | 737,377 | | |
| 35 to 39 years | 371,797 | | | |
| 40 to 44 years | 332,919 | 704,716 | 2,216,432 | 1,442,093 |
| 45 to 49 years | 352,344 | | | |
| 50 to 54 years | 385,213 | 737,557 | | |
| 55 to 59 years | 425,757 | | | |
| 60 to 64 years | 394,820 | 820,577 | 1,558,134 | 1,558,134 |
| 65 to 69 years | 329,181 | | | |
| 70 to 74 years | 242,442 | 571,623 | | 571,623 |
| 75 to 79 years | 169,120 | | | |
| 80 to 84 years | 116,094 | 285,214 | | |
| 85 years and over | 128,636 | 128,636 | 985,473 | 413,850 |
| | 5,813,568 | 5,813,568 | 5,813,568 | 5,813,568 |

| Male Age Group | Population Estimate | Inpatient Age Group Total | Ambulatory Surgery Data Age Group Total | Emergemcy Department Data Age Group Total |
|---|---|---|---|---|
| Under 5 years | 171,036 | | | |
| 5 to 9 years | 178,917 | | | |
| 10 to 14 years | 188,956 | 538,909 | 538,909 | 538,909 |
| 15 to 19 years | 193,230 | 193,230 | | |
| 20 to 24 years | 201,013 | 201,013 | | 394,243 |
| 25 to 29 years | 193,420 | | | |
| 30 to 34 years | 184,584 | 378,004 | | |
| 35 to 39 years | 188,315 | | | |
| 40 to 44 years | 168,401 | 356,716 | 1,128,963 | 734,720 |
| 45 to 49 years | 177,384 | | | |
| 50 to 54 years | 192,156 | 369,540 | | |
| 55 to 59 years | 210,643 | | | |
| 60 to 64 years | 194,865 | 405,508 | 775,048 | 775,048 |
| 65 to 69 years | 161,017 | | | |
| 70 to 74 years | 116,405 | 277,422 | | 277,422 |
| 75 to 79 years | 77,104 | | | |
| 80 to 84 years | 50,093 | 127,197 | | |
| 85 years and over | 44,734 | 44,734 | 449,353 | 171,931 |
| | 2,892,273 | 2,892,273 | 2,892,273 | 2,892,273 |

| Female<br>Age Group | Population Estimate | Inpatient Age Group Total | Ambulatory Surgery Data Age Group Total | Emergemcy Department Data Age Group Total |
|---|---|---|---|---|
| Under 5 years | 163,346 | | | |
| 5 to 9 years | 170,882 | | | |
| 10 to 14 years | 180,392 | 514,620 | 514,620 | 514,620 |
| 15 to 19 years | 185,188 | 185,188 | | |
| 20 to 24 years | 194,908 | 194,908 | | 380,096 |
| 25 to 29 years | 181,015 | | | |
| 30 to 34 years | 178,358 | 359,373 | | |
| 35 to 39 years | 183,482 | | | |
| 40 to 44 years | 164,518 | 348,000 | 1,087,469 | 707,373 |
| 45 to 49 years | 174,960 | | | |
| 50 to 54 years | 193,057 | 368,017 | | |
| 55 to 59 years | 215,114 | | | |
| 60 to 64 years | 199,955 | 415,069 | 783,086 | 783,086 |
| 65 to 69 years | 168,164 | | | |
| 70 to 74 years | 126,037 | 294,201 | | 294,201 |
| 75 to 79 years | 92,016 | | | |
| 80 to 84 years | 66,001 | 158,017 | | |
| 85 years and over | 83,902 | 83,902 | 536,120 | 241,919 |
| | 2,921,295 | 2,921,295 | 2,921,295 | 2,921,295 |

**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<br>Self-Inflicted<br>Assault<br>Undetermined |
| Drown/Submersion | Accidental<br>Self-Inflicted<br>Assault<br>Undetermined |
| Electric Current | Accidental<br>Undetermined |
| Explosion | Accidental<br>Self-Inflicted<br>Assault |
| Falls | Accidental<br>Self-Inflicted<br>Assault<br>Undetermined |
| Fire/Flames | Accidental<br>Self-inflicted<br>Assault<br>Undetermined |
| Firearms | Accidental<br>Self-Inflicted<br>Assault<br>Undetermined |
| Hot Objects/Scalds | Accidental<br>Self-Inflicted<br>Assault<br>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.