Release Notes:
Risk Adjustment - Version 1.0

Risk Adjustment

(Joint Commission Performance Measurement Systems Only)

Introduction

Risk adjustment is a statistical process used to identify and adjust for variation in patient outcomes that stem from differences in patient characteristics (or risk factors) across health care organizations. Depending on the presence of risk factors at the time of health care encounters, patients may experience different outcomes regardless of the quality of care provided by the health care organization. Comparing patient outcomes across organizations without appropriate risk adjustment can be misleading. By adjusting for the risks associated with outcomes of interest, risk adjustment facilitates a more fair and accurate inter-organizational comparison.

Below is a general outline of the risk adjustment process being applied to selected national hospital quality measures:

- Measurement systems must prepare data for risk adjustment by first identifying the measure population for which risk adjustment is to be used.
- Relevant binary risk factors must be identified for the measure and recoded to indicate the presence or absence of the risk factor. However, for continuous risk factors, the actual value of the risk factor is used with some modifications.
- If required risk factors such as sex, age, or admission source are blank or missing, the measurement system must provide an estimated value for each of these missing risk factors. The measurement system is to keep a record of the number of missing values and report this information to the Joint Commission (via the data element *Number of Cases with Missing or Invalid Risk Adjustment Data*).
- The measurement system must then apply the Risk Models included in the ***Risk Model Information File,*** provided by the Joint Commission, to their data to calculate predicted values for each episode of care in the measure population (i.e., numerators and denominators) for risk adjusted measures.
- The system must then calculate aggregate risk adjustment data elements and transmit them to the Joint Commission for each of the participating health care organizations.

The risk model information files will be provided to measurement systems that have successfully embedded a national hospital quality measure set that requires risk adjustment for one or more measures. The Joint Commission reserves the right to update or modify risk models as necessary to provide the best and most current models available. It is strongly recommended that measurement systems develop a flexible process that allows them to efficiently accommodate modifications to existing risk factor coefficients as well as the addition and/or deletion of risk factors. Modifications may also include changes to risk factor definitions.

National hospital quality measures currently requiring risk adjustment:

- AMI Mortality (AMI-9)
- VBAC (PR-1)
- Inpatient Neonatal Mortality (PR-2)
- Third or Fourth Degree Laceration (PR-3)

Since these four risk adjusted measures are proportion-type measures, the risk adjustment process will be similar for these measures. The following section describes in more detail the risk adjustment process that the performance measurement systems must implement. For illustration purposes, AMI-9 and PR-2 are referenced throughout this section.

Note: As more risk adjusted national hospital quality measures are added, this section will be updated.

Risk Model Application Steps

Measurement systems must complete the following steps in order to properly risk adjust and submit risk-adjusted data to the Joint Commission:

Step 1 Identify the measure population through *Measure Category Assignments*.

- For each risk adjusted rate-based measure, identify the numerator (*Measure Category Assignment E*) and the denominator (*Measure Category Assignment D*) cases using the information provided in the Measure Information Form (MIF). In the case of measure AMI-9, include all patients episode of care (EOC) records who have a principal diagnosis of AMI and meet the criteria for inclusion in the measures population. All AMI patients who died [Category Assignment = E ("In Numerator Population")] and all AMI patients who lived [Category Assignment = D ("In Measure Population")].
- For each risk adjusted continuous variable measure identify the number of cases in the measure population (*Measure Category Assignment D*). At this time there are no risk adjusted continuous outcome measures in any of the national hospital quality measure sets.

Step 2 Create risk factors for the measure.

Using the *Risk Model Information File* provided by the Joint Commission, identify all applicable EOC record data elements and the associated risk factor values for each of the EOC records identified in step 1.

Risk factors include patient demographic and/or clinical factors, which can influence outcomes of care. Some examples of risk factors include age, sex, and comorbidities – such as diabetes or a history of hypertension. As an example, Figure 1 lists the data elements required for risk adjustment of AMI-9. Using the AMI-9 data set, the performance measurement system must identify the risk factors at the EOC record-level, and create data subsets for each participating health care organization (HCO).

Figure 1: Data Elements Required for Risk Adjustment

Measure	Risk Adjustment Data Elements
AMI-9 AMI Inpatient Mortality	*Admission Source* *Age (Calculated from Admission Date and Birthdate)* *ICD-9-CM Other Diagnosis Codes (multiple occurrences)* *Sex*

Note: A comprehensive list of the risk factors and corresponding definitions will be provided separately for each risk adjusted national hospital quality measure. See Appendix B for the Risk Factor Definitions that includes risk factor code tables associated with each measure. Any changes to this list will be communicated to performance measurement systems when the risk model information file is distributed. New patient risk factors may be identified in the future and will be incorporated into the risk model.

Risk factors can be classified into two types: binary (dichotomous) or continuous.

Binary risk factors are assigned a numerical value of one (1) to depict the occurrence or presence of a specific risk factor, or a zero (0) to depict the non-occurrence or absence of the risk factor in the EOC record. For example, binary risk factors can be constructed from the national hospital quality data elements *Sex*, *Admission Source* or *ICD-9-CM Other Diagnosis Codes*. The logic for creating a binary risk factor is illustrated in the following example.

Example: **"**RF05" is the variable name assigned to Diabetes Mellitus

1. Initialize RF05 to 0 (non-occurrence)
2. For each EOC record, if any of the possible 16 ICD-9-CM diagnosis codes include one of the following codes (250.01,250.03,250.10 to 250.93, 648.00 to 648.04, 648.81), then RF05 is set to 1 (occurrence or present) for that record.

Continuous risk factors can take on an infinite number (∞) of values, from -∞ to +∞. They can be entered directly or created from other data elements. For example, the risk factor age is derived from national hospital quality measure data elements *Admission Date* and *Birthdate*.

Example: **"**AGE" variable

- Patient Age (in years) = *Admission Date* minus *Birthdate*.

Note: The algorithm to calculate age must use the month and day portion of Admission Date and Birth Date to yield the most accurate age. Once calculated, use the age in years, expressed as an integer. Do not round up.

In the AMI measure set, a risk factor named AGET5095 has been created from the patient age. AGET5095 is age truncated between 50 and 95. In other words, all age values less than 50 have been assigned the age value of 50 and all age values above 95 are assigned a value of 95.

Interactions may be used to explain the joint effect of two or more independent variables (risk factors) on a dependent variable (outcome of interest). Interactions occur when two or more risk factors not only have separate effects but also have combined effects on the outcome of interest. In other words when an interaction is significant, it is implied that the effect on the outcome interest of one factor depends on the level of another factor. For example the rate of AMI mortalities increases with age, however this rate is increased more if the patient is male. This implies a two-way interaction of age and sex.

In the measure risk adjustment process, the interaction will be depicted by two or more risk factors connected by an underscore as in AGEINT_SEXR, indicates an interaction of integer value of age and sex. For calculation purposes, the risk factor AGEINT is multiplied by the variable SEXR.
If an interaction between age and sex has a coefficient of –0.0134 and the age is given as 55 and the sex is female, then the calculation for this interaction would be:

-0.0134*AGEINT*SEXR=
-0.0134*age)AGEINT=55)*sex (SEXR=1)=
-0.0124*55*1=0.737

Note; * indicates multiplication.

Step 3 Managing missing risk factor data.

Risk adjusting national hospital quality measures without assessing the extent of missing data for risk factors may result in the transmission of biased data. In particular, if missing data occur in a non-random fashion, the data analysis can be misleading. Several statistical methods exist that can be used to handle missing risk factor data.

Performance measurement systems are required to replace any missing risk factor data with estimated (or imputed) data using the procedures described below, regardless of the missing risk factor percentages.

Note: Replacement of missing risk factors occurs after each EOC's category assignment has been determined.

1. **Missing data percentage:** Calculate the number of EOC records per measure per HCO per month, that include one or more missing risk factors (i.e., contained in the ***Risk Model Information File***) for the measure. Submit this number to the Joint Commission using the data element, *Number Cases With Missing or Invalid Risk-Adjustment Data*. Refer to the Missing and Invalid Data section and the *ORYX® Technical Implementation Guide* for additional information.
2. **Continuous risk factor:** Calculate an estimated value using the arithmetic average (rounded to six decimal places) of all organizations' data available for the measure. However, for age, the average is calculated and only the integer portion is retained. This estimated value should be inserted for all missing data occurrences of that risk factor for all HCOs.
3. **Binary risk factor:** The estimated value used is the most frequently occurring response (or mode) for all organizations' data available for the measure. This estimated value should be inserted for all missing data occurrences of the risk factor in question for all HCOs. When a tie occurs in the frequencies, use the baseline of 0 as the estimated value. It is very important to note that missing value replacements do not apply to clinical risk factors because these are derived from ICD-9-CM Codes. If an ICD-9-CM Other Diagnosis Code field, used to identify risk factor is not populated, it is assumed that no risk factor was associated with the patient in that field. It is therefore not likely at all that every *ICD-9-CM Other Diagnosis Code* data element field will be populated.

Note: If an EOC is a member of multiple measures, the missing risk factor data may be assigned a different estimated value for each measure. Replacement of missing risk factors occurs after each EOC's category has been determined.

Step 4 Calculate the EOC predicted value using risk model information file

Calculate the predicted values (case-level risk adjusted rate) for each EOC record using the risk model information provided by the Joint Commission.

The Joint Commission will specify the risk model equation type in the *Risk Model Information File*. Performance measurement systems must use the risk model equation to calculate predicted values. For example, AMI-9 uses **logistic regression** as the risk model equation type, since it is a rate-based proportion measure. Continuous variable measures (to be considered in the future) will utilize **linear regression** methods. Additionally, the *Risk Model Information File* will contain the measure's risk factor variables and related regression coefficients. See Figure 2 for information concerning the layout of the *Risk Model Information File*. See Figure 3 for an example of a *Risk Model Information File* later in this section.

- Regression coefficients are a common component of risk models and are defined as a weight or number that indicates the associated relationship between a dependent variable (outcome of care) and an independent variable (risk factor).
- All calculations of predicted values are computed at the EOC record-level using measure population data (such as the AMI-9 data set).

- The predicted values are calculated by first multiplying regression coefficients by an appropriate risk factor value. If the risk factor is binary, then the value indicates the presence or absence of a factor. If the risk factor is continuous, then the risk factor is an appropriate value specifying a level of the variable. A more detailed explanation of this calculation process is given below.
- The following equation calculates the predicted EOC value (*y)* [i.e., probability] for rate-based measures:

$$Predicted\,Value\,(y) = \frac{1}{1 + e^{-(B_0 + B_1 * X_1 + \ldots + B_n * X_n)}}$$

Where:

- e^V is the exponential function [also may be written as exp(V)] that is the value of the intercept parameter generated by each model;
- $B_0 \ldots B_n$ are the Joint Commission provided regression coefficients; and
- $X_1 \ldots X_n$ are the calculated risk factor values.

The exponential value (e) is rounded to 8 decimal points for calculation purposes. The exponential value (e) *is an irrational number that is a universal constant, and is the base of natural logarithms.*

$$e^1 = \exp(1) = 2.71828182$$

Step 5 Calculate the HCO aggregate risk-adjustment data elements.

By aggregating the predicted value for each EOC, calculate each HCO's risk-adjusted data elements that are sent to the Joint Commission (Refer to the Steps to Calculate Rates and Measurements Section for details). The formulas and transmission specifications can be found in the *ORYX Technical Implementation Guide.*

Examples of Risk Adjustment Data Element Calculations

The following examples demonstrate steps used to calculate the Predicted Value *(y)* for an EOC record in a rate-based measure population.

Example 1: AMI Inpatient Mortality (AMI-9)

Suppose an AMI patient has the following risk factors. This patient's predicted mortality probability can be calculated using a hypothetical risk model.

EOC Record Data Element Value	**Risk Factor Name** **(Risk factors included in the model)**	**Risk Factor Value**
Sex = female	SEXR (male = 0; female = 1)	X_1 =1

Age = 75	AGET5095 (Age calculated and truncated to 50 and 95)	X_2 =75
Admission Source = 5	ADMSRC56 = 5 or 6 (Admission Source =5 or 6; Yes = 1 No = 0)	X_3 =1
ICD-9-CM Principal Diagnosis Code=410.71	PRF203S (Yes=1, No=0)	X_4 =1
ICD-9-CM Other Diagnosis Code_01=648.01	RF05 (Yes=1, No=0)	X_5 =1
ICD-9-CM Other Diagnosis Code_02=305.1	RF06C (Yes=1, No=0)	X_6 =1
ICD-9-CM Other Diagnosis Code_03=V15.82	RF06HX (Yes=1, No=0)	X_7 =1
	RF14 (Yes=1, No=0)	X_8 =0
ICD-9-CM Other Diagnosis Code_04=572.8	RF15 (Yes=1, No=0)	X_9 =1
	RF17 (Yes=1, No=0)	X_{10} =0
	RF18 (Yes=1, No=0)	X_{11} =0
ICD-9-CM Other Diagnosis Code_06=V45.82	RF207 (Yes=1, No=0)	X_{12} =1

Example Regression Coefficients Provided by the Joint Commission
For AMI-9

B_0 = - 6.2596	Intercept Constant
B_1 = + 0.1352	Coefficient for SEXR (X_1)
B_2 = + 0.0573	Coefficient for AGET5095 (X_2)
B_3 = + 0.5435	Coefficient for ADMSRC56 (X_3)
B_4 = - 1.0815	Coefficient for PRF203S (X_4)
B_5 = + 0.2671	Coefficient for RF05 (X_5)
B_6 = - 0.5340	Coefficient for RF06C (X_6)
B_7 = - 0.3999	Coefficient for RF06HX (X_7)
B_8 = + 0.7599	Coefficient for RF14 (X_8)
B_9 = + 1.4786	Coefficient for RF15 (X_9)
B_{10} = + 0.5011	Coefficient for RF17 (X_{10})
B_{11} = + 0.3472	Coefficient for RF18 (X_{11})
B_{12} = - 0.2424	Coefficient for RF207 (X_{12})

Using the risk factor values X_1, X_2, X_3 ... X_{12} in the example EOC record, the Predicted Value (y) and the regression coefficients from the example above can be calculated as follows:

$$\text{Predicted Value (y)} = \frac{1}{1+e^{-V}},$$

Where $V = B_0 + B_1X_1 + \ldots\ldots\ldots\ldots + B_nX_n$

Therefore, V in this example is calculated to be the sum of the following operations,

V= - 6.2596 + 0.1352*(1) + 0.0573*(75) + 0.5435*(1) - 1.0815*(1) + 0.2671*(1) - 0.5340*(1) - 0.3999*(1) + 0.7599*(0) + 1.4786*(1) + 0.5011*(0) + 0.3472*(0) - 0.2424*(1)

= -1.7955

The Predicted Value *(y)* for the EOC in this example calculates to:

$$(y) = \frac{1}{1+e^{-(-1.7955)}} = \frac{1}{1+(2.71828182)^{1.7955}} = 0.142400$$

After the predicted value is calculated for every EOC record in the measure population, the HCO level risk-adjusted data elements can be calculated by aggregating EOC-level predicted values for each health care organization.

Example 2: Inpatient Neonatal Mortality (PR-2)

Suppose a newborn's birth weight was 1,400 grams (in this example captured by ICD-9-CM code). The predicted mortality probability can be calculated using a hypothetical risk model.

EOC Record Data Element Value	Risk Factor Name	Risk Factor Value
Sex = female	SEXR (male = 0; female = 1)	X_1 =1
	RF362 (Yes=1, No=0)	X_2=0
ICD-9-CM Other Diagnosis Code_01=764.25	RF363 (Yes=1, No=0)	X_3=1
	RF364 (Yes=1, No=0)	X_4=0
	RF365 (Yes=1, No=0)	X_5=0
	RF304 (Yes=1, No=0)	X_6 =0
	RF305 (Yes=1, No=0)	X_7 =0
	RF306 (Yes=1, No=0)	X_8 =0
	RF308 (Yes=1, No=0)	X_9 =0

ICD-9-CM Other Diagnosis Code_02=778.0	RF310 (Yes=1, No=0)	X_{10} =1
	RF311 (Yes=1, No=0)	X_{11} =0
	RF312 (Yes=1, No=0)	X_{12} =0
	RF314 (Yes=1, No=0)	X_{13} =0
	RF315 (Yes=1, No=0)	X_{14} =0
	RF316 (Yes=1, No=0)	X_{15} =0
ICD-9-CM Other Diagnosis Code_06=777.5	RF318 (Yes=1, No=0)	X_{16} =1

Example Regression Coefficients Provided by the Joint Commission
For Inpatient Neonatal Mortality (PR-2)

B_0 = - 7.545	Intercept Constant
B_1 = - 0.2714	Coefficient for SEXR (X_1)
B_2 = + 6.5223	Coefficient for RF362 (X_2)
B_3 = + 3.9024	Coefficient for RF363 (X_3)
B_4 = + 3.2064	Coefficient for RF364 (X_4)
B_5 = + 2.5294	Coefficient for RF365 (X_5)
B_6 = + 4.9123	Coefficient for RF304 (X_6)
B_7 = + 3.988	Coefficient for RF305 (X_7)
B_8 = + 3.6175	Coefficient for RF306 (X_8)
B_9 = + 1.7505	Coefficient for RF308 (X_9)
B_{10} = + 2.9708	Coefficient for RF310 (X_{10})
B_{11} = + 2.5632	Coefficient for RF311 (X_{11})
B_{12} = + 3.4076	Coefficient for RF312 (X_{12})
B_{13} = + 1.2375	Coefficient for RF314 (X_{13})
B_{14} = + 1.0759	Coefficient for RF315 (X_{14})
B_{15} = + 2.0084	Coefficient for RF316 (X_{15})
B_{16} = - 0.4435	Coefficient for RF318 (X_{16})

Using the risk factor values X_1, X_2, $X_{3\ ...}$ X_{16} in the example EOC record, the Predicted Value *(y)* and the regression coefficients from the example above can be calculated as follows:

$$\text{Predicted Value (y)} = \frac{1}{1+e^{-V}},$$

Calculating V as demonstrated in the previous example, the Predicted Value (y) for the EOC in this example calculates to:

$$(y) = \frac{1}{1+e^{-(-1.3867)}} = \frac{1}{1+(2.71828182)^{+1.3867}} = 0.199935$$

In example 2 this newborn record would be assigned a predicted probability of 0.199935. This value is aggregated with the other EOC predicted probabilities in the PR-2 measure population to calculate the risk adjusted data elements for each health care organization.

Figure 2: Risk Model Information File Layout

Field Name	Format	Content
Quarter	N6	Specifies a combination of the Year and Quarter to which the risk factors and model should be applied (e.g., 200203 references 3rd quarter 2002)
Measure_ID	N10	Contains the unique *Performance Measure Identifier* (used for ORYX data transmission) for the measure to which the risk factor applies
Eq_Type	N1	Identifies which risk model equation is to be used for the *Predicted Value* calculation **1 =** If logistic regression model, i.e., $Predicted\ Value\ (y) = \frac{1}{1+e^{-(B_0+B_1*X_1+B_2*X_2+...+B_n*X_n)}}$ **2 =** If multiple regression model with transformation of dependant variable, i.e., $Predicted\ Value\ (y) = e^{B0+B1*X1+B2*X2+...+Bn*Xn}$ **3 =** If multiple regression model without transformation, i.e., $Predicted\ Value\ (y) = B_0+B_1*X_1+B_2*X_2+...+B_n*X_n$ Where $B_0...B_n$ are the Joint Commission provided regression coefficients, $X_1...X_n$ are the created risk factor values, and *e* is the exponential function with *e*=2.71828182
Factor_ID	AN12	Identifies the risk factor by a unique name N = Not applicable (to be used for constant term/intercept B_0)
Factor_Status	N1	Identifies whether the risk factor is existing or new 1 = existing (i.e., risk factor as defined in the current listing) 2 = new (i.e., changed risk factor as defined in the new listing, or a new risk factor) 3 = not applicable (to be used for constant term/intercept B_0)
Factor_Type	AN1	Identifies whether the risk factor is continuous or binary C = Risk factor is continuous B = Risk factor is binary N = Not applicable (to be used for constant term/intercept B_0)
Short Name	AN40	Briefly describes the risk factor. The full definition is provided in Appendix B.
Coefficients	N3.6	Contains regression coefficients, accurate to 6 decimal places Must support a leading negative sign for negative numbers, e.g., Positive = 2.790345 and Negative = **-** 2.790345

Figure 3: Risk Model Information File Example

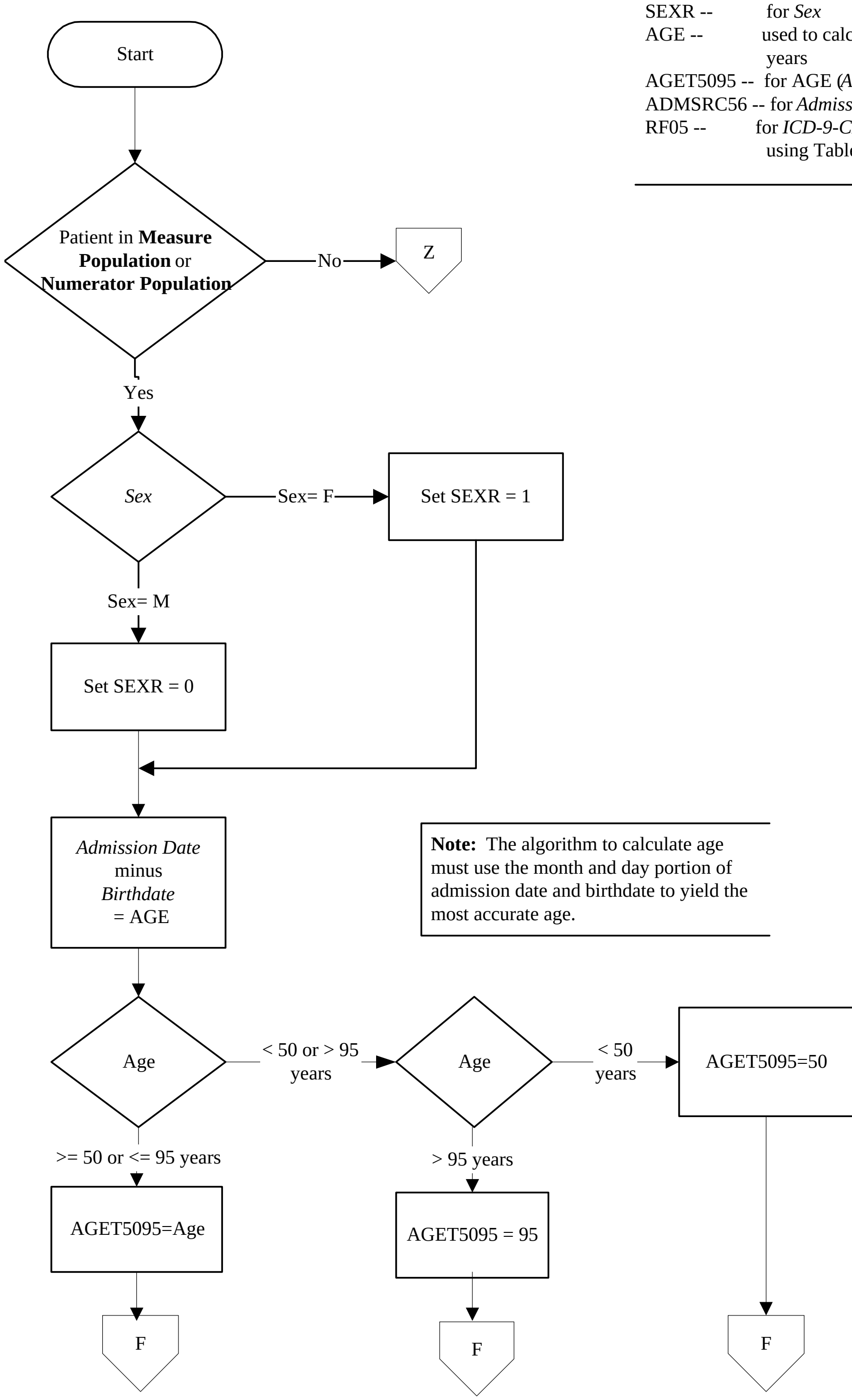
This sample does **not** reflect the latest risk model information file. The current version of the complete risk model information file layout and example is provided on the Performance Measurement System Extranet Track (PET).

Quarter	Measure ID	Equation Type	Factor ID	Factor Status	Factor Type	Short Name	Coefficient
200203	14233	1	N	3	N	Constant term	-6.2596
200203	14233	1	ADMSRC56	1	B	Admission Source= 5 or 6	0.5435
200203	14233	1	AGET5095	1	C	Age truncated 50-95	0.0573
200203	14233	1	SEXR	1	B	Sex =Male or Female	0.1352
200203	14233	1	RF05	1	B	Diabetes Mellitus	0.2671
200203	14233	1	RF06C	1	B	Current Smoker	-0.534
200203	14233	1	RF06HX	1	B	History of Smoking	-0.3999
200203	14233	1	RF14	1	B	Chronic Renal Disease (w, w/o) Renal Failure	0.7599
200203	14233	1	RF15	1	B	Chronic Liver Disease	1.4786
200203	14233	1	RF17	1	B	COPD	0.5011
200203	14233	1	RF18	1	B	Cardiomyopathy	0.3472
200203	14233	1	PRF203s	1	B	Site of Infarct-Subendocardial	-1.0815
200203	14233	1	RF207	1	B	History of PCI	-0.2424
200203	14547	1	N	3	N	Constant Term	0.3993
200203	14547	1	Aget1744	1	C	Age truncated 17-44	-0.0311
200203	14547	1	RF05M	1	B	Diabetes in Pregnancy	-0.5532
200203	14547	1	RF101M	1	B	Abnormal Presentation	-1.2936
200203	14547	1	RF106M	1	B	Other Hypertensions in Pregnancy	-0.1961
200203	14547	1	RF107M	1	B	Polyhydramnios	-0.5703
200203	14547	1	RF108M	1	B	Abnormality of Organs and Soft Tissues of the Pelvis	-1.2417
200203	14547	1	RF109M	1	B	Large Fetus (Oversize)	-0.8246
200203	14547	1	RF111M	1	B	Eclampsia, Pre-eclampsia	-0.5991
200203	14547	1	RF114M	1	B	Placenta Previa w/o Hemorrhage	-1.3237
200203	14547	1	RF116M	1	B	Antepartum Hemorrhage	-0.9198
200203	14547	1	RF118M	1	B	Disproportion	-2.2802
200203	14547	1	RF119M	1	B	Failure to Progress	-0.5248
200203	14548	1	N	3	N	Constant Term	-7.545
200203	14548	1	SEXR	1	B	Sex =Male or Female	-0.2714
200203	14548	1	RF362	2	B	Birth weight between 500 and 749 grams	6.5223
200203	14548	1	RF363	2	B	Birth weight between 750 and 999 grams	3.9024
200203	14548	1	RF364	2	B	Birth weight between 1000 and 14999 grams	3.2064
200203	14548	1	RF365	2	B	Birth weight between 1500 and 1999 grams	2.5294
200203	14548	1	RF304	1	B	Patau's Syndrome	4.9123

Quarter	Measure ID	Equation Type	Factor ID	Factor Status	Factor Type	Short Name	Coefficient
200203	14548	1	RF305	1	B	Edward's Syndrome	3.988
200203	14548	1	RF306	1	B	Agenesis of Lung	3.6175
200203	14548	1	RF308	1	B	Multiple Congenital Anomalies	1.7505
200203	14548	1	RF310	1	B	Hydrops Fetalis not due to Isoimmunization	2.9708
200203	14548	1	RF311	1	B	Renal Agenesis	2.5632
200203	14548	1	RF312	1	B	Severe Birth Asphyxia	3.4076
200203	14548	1	RF314	1	B	Disseminated Intravascular Coagulation in Newborn	1.2375
200203	14548	1	RF315	1	B	Newborn Pulmonary Hemorrhage	1.0759
200203	14548	1	RF316	1	B	Anomalies of Diaphragm	2.0084
200203	14548	1	RF318	1	B	Necrotizing Enterocolitis in Fetus or Newborn	-0.4435
200203	14555	1	N	3	N	Constant term	-3.0134
200203	14555	1	MAGE20L	1	B	Age <=20	-0.1289
200203	14555	1	RF102M	1	B	Multiple Gestations	-1.0043
200203	14555	1	RF109M	1	B	Large Fetus (Oversize)	0.5608
200203	14555	1	RF118M	1	B	Disproportion	0.4542
200203	14555	1	RF301M	1	B	Precipitate Labor	-0.8875
200203	14555	1	RF302M	1	B	Episiotomy	0.4466
200203	14555	1	RF303M	1	B	Operative Vaginal Delivery	2.1552

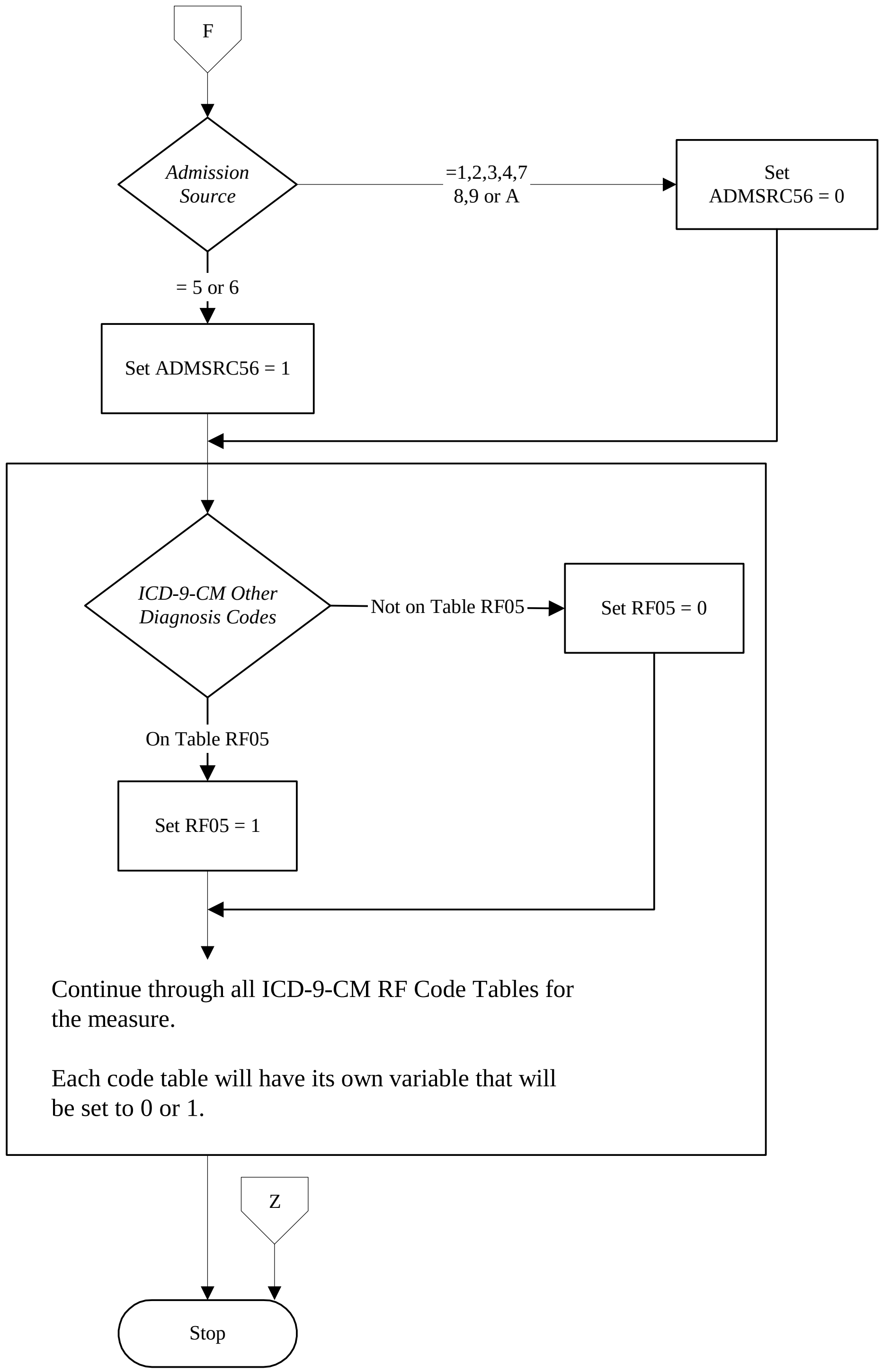
Risk Model Example
AMI-9: Inpatient Mortality
Numerator: Inpatient mortality of AMI patients.   **Denominator:** AMI patients.

Risk Factor Variable Names:
SEXR -- for *Sex*
AGE -- used to calculate patient's age in years
AGET5095 -- for AGE (*Admission Date - Birthdate)*
ADMSRC56 -- for *Admission Source*
RF05 -- for *ICD-9-CM Other Diagnosis Codes* using Table RF05



Note: The algorithm to calculate age must use the month and day portion of admission date and birthdate to yield the most accurate age.

Risk Model Example - Continued



Note: For additional information see Appendix B for a list of risk factors.

Submitting Patient-Level Data

Refer to the *ORYX Technical Implementation Guide* for details on transmitting patient level data.