**Instructions on Using the SAS Codes for Calculating Member Level Risk Scores**

****

June, 2013

Table of Contents

[1. Disclaimer 3](#_Toc359316842)

[2. SAS Codes 3](#_Toc359316843)

[3. SAS System Requirements 4](#_Toc359316844)

[4. Input Data Preparation 4](#_Toc359316845)

[4. Output Data Elements 7](#_Toc359316846)

# 1. Disclaimer

Risk adjustment is a permanent risk mitigation and premium stabilization program under the Patient Protection and Affordable Care Act (“ACA”). The Commonwealth of Massachusetts will administer its own risk adjustment program based on the federally certified Massachusetts Alternate Risk Adjustment Methodology. The Massachusetts Commonwealth Health Insurance Connector Authority (“Health Connector”) is the designated entity to administer the Commonwealth’s risk adjustment program. The Massachusetts Notice of Benefit and Payment Parameters 2014 (“Massachusetts Payment Notice”) with detailed descriptions and technical details of the risk adjustment methodology can be found on the Health Connector’s website : <https://www.mahealthconnector.org/portal/site/connector/menuitem.d7b34e88a23468a2dbef6f47d7468a0c>.

This main SAS program and its associated SAS programs, collectively referred to as the “Risk Score Calculation SAS Codes”, or the “SAS Codes”, are based on the above Massachusetts Payment Notice. The SAS Codes assign risk scores at the individual level using membership and medical claims data (specifically associated diagnosis, revenue, and procedure codes). The main output file from the SAS Codes contain five risk scores for each individual, one for each ACA defined benefit or metal level – Platinum, Gold, Silver, Bronze and Catastrophic. It also includes the Hierarchical Condition Categories (HCCs) used in risk scoring.

A risk score from the SAS Codes estimates an individual’s healthcare resource use under a chosen metal level plan relative to the average individual in the model development sample. For example, a Platinum risk score of 1.10 suggests that the individual, when covered by a Platinum plan, is estimated to use 10% more health care resources than the average individual in the model development sample across all metal levels (not just across all Platinum members). The Massachusetts Payment Notice and supporting technical documentation provide a description of the data used in model development.

Generating individual risk scores is an important first step in the risk adjustment funds transfer calculations. From the individual risk scores to funds transfer and premium redistribution, there are a few additional steps of calculation at the state level involving data from all issuers subject to risk adjustment.

Finally, the SAS Codes should only be used and interpreted by people with proper knowledge in the Massachusetts Alternate Risk Adjustment Methodology, health care claims data and the SAS programming language. Neither the Health Connector nor its agents or subcontractors shall be liable for any claims or damages of any kind arising from the use of the SAS Codes.

# 2. SAS Codes

The SAS Codes contain a main program titled “MAIN.sas”, and eleven associated programs and two SAS datasets that are contained in a separate folder titled “Associated Programs and Datasets”. The associated programs and datasets should NOT be modified.

User input is required in MAIN.sas that requires users input. Data values required are:

1. DX\_MAX- maximum number of diagnosis fields on a claim line
2. PERSON – name of the membership file
3. DIAGNOSIS – name of the claims file
4. OUTFILE - name of the output dataset
5. LOC – location of the associated programs and datasets
6. DATE\_ASOF\_FIRST – first day of the observation period. An observation period should be 12 months.
7. DATE\_ASOF\_LAST – last day of the observation period.
8. LIBNAME INF - location of the input files
9. LIBNAME OUTF – location of the output file

The associated programs are:

1. AGE\_FACTOR.sas
2. CSR\_RISK.sas
3. HCC\_LABEL.sas
4. Hierarchy.sas
5. Table A.1 Bundled Childbirth Diagnoses.sas
6. Table A.3A Rev\_NOHCC.sas
7. Table A.3B Proc\_NOHCC.sas
8. UNADJ\_RISK\_BRONZE.sas
9. UNADJ\_RISK\_GOLD.sas
10. UNADJ\_RISK\_PLATINUM.sas
11. UNADJ\_RISK\_SILVER.sas

The two associated datasets are:

1. Table\_a2\_excl\_dx.sas7bdat
2. Table\_a4\_icd2cc.sas7bdat

To run the SAS Codes, an issuer is expected to have prepared two input SAS datasets. The SAS system requirements and detailed description of the input datasets are provided in the sections that follow.

# 3. SAS System Requirements

To run the SAS Codes, a SAS/Base product is required. The Health Connector does not recommend any versions of the SAS/Base product, but believe that the SAS Codes will work with SAS versions 8.0 and above.

# 4. Input Data Preparation

In this section we describe the input data that issuers should prepare prior to running the SAS Codes. We describe the data fields minimally required in the input data for the SAS Codes to run correctly. Please note that these fields only constitute a subset of the data elements the Health Connector requires to operate the risk adjustment program. All of the data fields described below are either currently being submitted to the Center for Health Information and Analytics (“CHIA”) by carriers to the Massachusetts All-Payer Claims Database (“APCD”), or will become part of the APCD submission in the future.

Issuers should prepare two input files prior to running the Risk Score Calculation Codes – a membership file and a medical claims file. To ensure correct calculations of the risk scores, both files should reflect the same 12 month observation period. Members with less than 12 months of enrollment during the observation period should be included. The medical claims file should reflect claims incurred in the 12 month observation period and paid through 3 months after the end of the observation period.

1. Membership file.
   * The membership file should contain one member-plan combination per record line; that is, if a member changed from Benefit Plan A to Benefit Plan B with the same issuer during the 12-month observation period, two separate lines should be included in the membership file.
   * Required fields on the membership file are:
     + MEMBER\_PLAN\_INDEX (Member-plan ID, alphanumeric field. Linkable to medical claims.)
     + SUBSCRIBER\_FLAG (Subscriber Indicator, numeric field. “1”=Yes, the member is a subscriber, “0”=No, the member is not a subscriber)
     + BILLABLE\_FLAG (Billable Member Indicator, numeric field. “1”=Yes, the member is billable. “0”=No, the member is not billable. )
     + DOB (Member date of birth, SAS date field)
     + SEX (Member gender, character field. "M"=Male, "F"=Female)
     + MMOS (Member enrolled months in a benefit plan, numeric field.)
     + CSR\_INDICATOR (Cost-sharing reduction indicator, numeric field. “0”= Not eligible for CSR; “1”=Member enrolled in 99.6 AV Silver Plan Variation, with wrap subsidies provided by the Commonwealth in addition to what is allowed under the ACA; “2”=Member enrolled in 95.0 AV Silver Plan Variation, with wrap subsidies provided by the Commonwealth in addition to what is allowed under the ACA; “3"= Member enrolled in 92.5 AV Silver Plan Variation, with wrap subsidies provided by the Commonwealth in addition to what is allowed under the ACA.)
     + METAL\_LEVEL (Plan metal level, i.e., PLATINUM, GOLD, SILVER, BRONZE, and CATASTROPHIC, character field, all upper cases. Please note that Silver Variation Plans with higher actuarial values should be categorized as SILVER plans.)
     + PLANID (Issuer-generated benefit plan identifier, alphanumeric field.)

* Additional member-level information, such as the plan actuarial value calculated from the federal actuarial value calculator, subscriber status, subscriber zip code (for when the member is covered under a nongroup plan), employer zip code (for when the member is covered under a small group plan), geographic rating area, the APCD market category code (indicates group size), and monthly premium, will not affect individual risk scores, although they will impact the funds transfer calculations and premium redistribution at the issuer level. Issuers may want to retain these data fields on the membership file, as well as additional data fields for internal analyses. These fields will not be used by the SAS Codes. However they will appear on the final output file.
* The membership file should be sorted by MEMBERID.

Below is an illustrative example of the membership file used as input for risk scoring.



1. Medical claims file.

* If a member changes from Benefit Plan1 to Benefit Plan2 with the same issuer during the 12-month observation period, the member’s medical claims will be separated by plan for risk scoring by linking the member-plan identifier in the member file and the member-plan identifier in the medical claims file.
* Incurred dates for claims included in the medical claims file should match the enrollment period. For example, if the enrollment period is 1/1/2012 through 12/31/2012, the incurred claims period should be exactly the same with claims paid through 3/31/2013.
* Claims should have 3 months of run-out to be consistent with the Massachusetts Alternate Risk Adjustment Methodology.
* Denied claims shall be excluded from claims included in the medical claims file. Adjusted claims typically include the same diagnosis information as the corresponding original claims and will not affect the risk scores because the Hierarchical Condition Categories (HCCs) in the Massachusetts Alternate Risk Adjustment Methodology are flagged based on the presence of diagnoses rather than the counts. However, total incurred and paid amounts will be affected by the inclusion or exclusion of adjusted claims.
* Medical claims from all sites of service should be included. The SAS Codes contain logic to filter out diagnosis codes from clinically invalid sources using revenue and procedure codes in the claims. No additional filtering or exclusions should be required by users.
  + Required Variables in the medical claims file:
    - MEMBER\_PLAN\_INDEX (Member-plan ID, alphanumeric field. Linkable to the membership file.)
    - PROC\_CODE (CPT Procedure Code, character field)
    - REV\_CODE (Revenue code, character field)
    - DX1-DXN (ICD-9-CM diagnosis code for up to N fields, where N is the maximum number of diagnosis fields an issuer maintains in its claim system, character field, no decimal. )
  + Other data fields on standard medical claims, such as service from and to dates, claim paid date, place of service, provider identifier, DRG, etc., are not required for calculating risk scores and will not be retained in the output dataset from the SAS Codes.
  + The medical claims file should be sorted by MEMBERID.

Below is an illustrative example of the medical claims file used as input for risk scoring.



# 4. Output Data Elements

The SAS Codes generate an output dataset that is one member-plan per record line. It adds the following variables to the existing required and user-supplied data fields on the membership file

* Basic data fields.
  + MEMBER\_PLAN\_INDEX
  + SUBSCRIBER\_FLAG
  + BILLABLE\_FLAG
  + AGE\_FIRST
  + AGE\_LAST
  + SEX
  + MMOS
  + CSR\_INDICATOR
  + METAL\_LEVEL
  + FINAL\_CSR\_RISK – final risk score to be used in risk adjustment funds transfer calculation. It corresponds to the member’s metal level and CSR status.
* Risk scores. The SAS Codes generate the following 10 risk scores for each member below, plus a final risk score, FINAL\_CSR\_RISK, for each member in the membership file.
  + UNADJ\_RISK\_PLATINUM – risk score from the Platinum model, not adjusted by cost-sharing reduction
  + UNADJ\_RISK\_GOLD – risk score from the Gold model, not adjusted by cost-sharing reduction
  + UNADJ\_RISK\_SILVER – risk score from the Silver model, not adjusted by cost-sharing reduction
  + UNADJ\_RISK\_BRONZE – risk score from the Bronze model, not adjusted by cost-sharing reduction
  + UNADJ\_RISK\_CATASTROPHIC – risk score from the Catastrophic model, not adjusted by cost-sharing reduction. Please note that for Benefit Year 2014, the Commonwealth will use the Bronze model to assign risk scores for members enrolled in Catastrophic plans.
  + CSR\_PLATINUM – risk score from the Platinum model, adjusted by cost-sharing reduction
  + CSR\_GOLD – risk score from the Gold model, adjusted by cost-sharing reduction
  + CSR\_SILVER – risk score from the Silver model, adjusted by cost-sharing reduction
  + CSR\_BRONZE - risk score from the Bronze model, not adjusted by cost-sharing reduction
  + CSR\_CATASTROPHIC - risk score from the Catastrophic model, not adjusted by cost-sharing reduction
* HCC indicators – 0 or 1 binary indicators for whether a member has a certain Hierarchical Condition Category or not.

|  |  |
| --- | --- |
| HCC001 | HIV/AIDS |
| HCC002 | Septicemia/Shock |
| HCC003 | Central Nervous System Infection |
| HCC004 | Tuberculosis |
| HCC005 | Opportunistic Infections |
| HCC008 | Lung, Upper Digestive Tract, and Other Severe Cancers |
| HCC009 | Lymphatic, Head and Neck, Brain, and Other Major Cancers |
| HCC010 | Breast, Prostate, Colorectal and Other Cancers and Tumors |
| HCC011 | Other Respiratory and Heart Neoplasms |
| HCC012 | Other Digestive and Urinary Neoplasms |
| HCC013 | Other Neoplasms |
| HCC015 | Diabetes with Renal Manifestation |
| HCC016 | Diabetes with Neurologic or Peripheral Circulatory Manifestation |
| HCC017 | Diabetes with Acute Complications |
| HCC018 | Diabetes with Ophthalmologic Manifestation |
| HCC019 | Diabetes with No or Unspecified Complications |
| HCC020 | Type I Diabetes Mellitus |
| HCC021 | Protein-Calorie Malnutrition |
| HCC022 | Other Significant Endocrine and Metabolic Disorders |
| HCC023 | Disorders of Fluid/Electrolyte/Acid-Base Balance |
| HCC025 | End-Stage Liver Disease |
| HCC026 | Cirrhosis of Liver |
| HCC027 | Chronic Hepatitis |
| HCC028 | Acute Liver Failure/Disease |
| HCC029 | Other Hepatitis and Liver Disease |
| HCC030 | Gallbladder and Biliary Tract Disorders |
| HCC031 | Intestinal Obstruction/Perforation |
| HCC032 | Pancreatic Disease |
| HCC033 | Inflammatory Bowel Disease |
| HCC034 | Peptic Ulcer, Hemorrhage, Other Specified Gastrointestinal Disorders |
| HCC035 | Appendicitis |
| HCC036 | Other Gastrointestinal Disorders |
| HCC037 | Bone/Joint/Muscle Infections/Necrosis |
| HCC038 | Rheumatoid Arthritis and Inflammatory Connective Tissue Disease |
| HCC039 | Disorders of the Vertebrae and Spinal Discs (See HCC206) |
| HCC040 | Osteoarthritis of Hip or Knee |
| HCC041 | Osteoporosis and Other Bone/Cartilage Disorders |
| HCC042 | Congenital/Developmental Skeletal and Connective Tissue Disorders |
| HCC044 | Severe Hematological Disorders (See HCC207) |
| HCC045 | Disorders of Immunity |
| HCC048 | Delirium and Encephalopathy (See HCC209) |
| HCC049 | Dementia |
| HCC050 | Senility, Nonpsychotic Organic Brain Syndromes/Conditions |
| HCC051 | Drug/Alcohol Psychosis |
| HCC052 | Drug/Alcohol Dependence |
| HCC054 | Schizophrenia |
| HCC055 | Major Depressive, Bipolar, and Paranoid Disorders |
| HCC056 | Reactive and Unspecified Psychosis |
| HCC057 | Personality Disorders |
| HCC058 | Depression |
| HCC059 | Anxiety Disorders |
| HCC061 | Profound Mental Retardation/Developmental Disability |
| HCC062 | Severe Mental Retardation/Developmental Disability |
| HCC063 | Moderate Mental Retardation/Developmental Disability |
| HCC064 | Mild/Unspecified Mental Retardation/Developmental Disability |
| HCC065 | Other Developmental Disability |
| HCC066 | Attention Deficit Disorder |
| HCC067 | Quadriplegia, Other Extensive Paralysis |
| HCC068 | Paraplegia |
| HCC069 | Spinal Cord Disorders/Injuries |
| HCC070 | Muscular Dystrophy |
| HCC071 | Polyneuropathy |
| HCC072 | Multiple Sclerosis |
| HCC073 | Parkinson and Huntington Diseases |
| HCC074 | Seizure Disorders and Convulsions |
| HCC075 | Coma, Brain Compression/Anoxic Damage |
| HCC076 | Mononeuropathy, Other Neurological Conditions/Injuries |
| HCC077 | Respirator Dependence/Tracheostomy Status |
| HCC078 | Respiratory Arrest |
| HCC079 | Cardio-Respiratory Failure and Shock (See HCC210) |
| HCC080 | Congestive Heart Failure |
| HCC081 | Acute Myocardial Infarction |
| HCC082 | Unstable Angina and Other Acute Ischemic Heart Disease |
| HCC083 | Angina Pectoris/Old Myocardial Infarction |
| HCC084 | Coronary Atherosclerosis/Other Chronic Ischemic Heart Disease |
| HCC085 | Heart Infection/Inflammation, Except Rheumatic |
| HCC086 | Valvular and Rheumatic Heart Disease |
| HCC087 | Major Congenital Cardiac/Circulatory Defect |
| HCC088 | Other Congenital Heart/Circulatory Disease |
| HCC092 | Specified Heart Arrhythmias |
| HCC093 | Other Heart Rhythm and Conduction Disorders |
| HCC095 | Cerebral Hemorrhage |
| HCC096 | Ischemic or Unspecified Stroke |
| HCC097 | Precerebral Arterial Occlusion and Transient Cerebral Ischemia |
| HCC098 | Cerebral Atherosclerosis and Aneurysm |
| HCC100 | Hemiplegia/Hemiparesis |
| HCC102 | Speech, Language, Cognitive, Perceptual Deficits |
| HCC104 | Vascular Disease with Complications |
| HCC105 | Vascular Disease |
| HCC106 | Other Circulatory Disease |
| HCC107 | Cystic Fibrosis |
| HCC108 | Chronic Obstructive Pulmonary Disease |
| HCC109 | Fibrosis of Lung and Other Chronic Lung Disorders |
| HCC110 | Asthma |
| HCC111 | Aspiration and Specified Bacterial Pneumonias |
| HCC112 | Pneumococcal Pneumonia, Empyema, Lung Abscess |
| HCC113 | Viral and Unspecified Pneumonia, Pleurisy |
| HCC114 | Pleural Effusion/Pneumothorax |
| HCC115 | Other Lung Disorders |
| HCC116 | Legally Blind |
| HCC117 | Major Eye Infections/Inflammations |
| HCC118 | Retinal Detachment |
| HCC119 | Proliferative Diabetic Retinopathy and Vitreous Hemorrhage |
| HCC120 | Diabetic and Other Vascular Retinopathies |
| HCC122 | Glaucoma |
| HCC125 | Significant Ear, Nose, and Throat Disorders |
| HCC126 | Hearing Loss |
| HCC128 | Kidney Transplant Status |
| HCC130 | Dialysis Status |
| HCC131 | Non-Acute Renal Failure (See HCC211) |
| HCC132 | Nephritis |
| HCC133 | Urinary Obstruction and Retention |
| HCC134 | Incontinence |
| HCC135 | Urinary Tract Infection |
| HCC136 | Other Urinary Tract Disorders |
| HCC137 | Female Infertility |
| HCC138 | Pelvic Inflammatory Disease and Other Specified Female Genital Disorders |
| HCC141 | Ectopic Pregnancy |
| HCC142 | Miscarriage/Abortion |
| HCC143 | Completed Pregnancy With Major Complications |
| HCC144 | Completed Pregnancy With Complications |
| HCC145 | Completed Pregnancy Without Complications (Normal Delivery) |
| HCC146 | Uncompleted Pregnancy With Complications |
| HCC147 | Uncompleted Pregnancy With No or Minor Complications |
| HCC148 | Decubitus Ulcer of Skin |
| HCC150 | Extensive Third-Degree Burns |
| HCC151 | Other Third-Degree and Extensive Burns |
| HCC152 | Cellulitis, Local Skin Infection |
| HCC154 | Severe Head Injury |
| HCC155 | Major Head Injury |
| HCC156 | Concussion or Unspecified Head Injury |
| HCC157 | Vertebral Fractures |
| HCC158 | Hip Fracture/Dislocation |
| HCC159 | Major Fracture, Except of Skull, Vertebrae, or Hip |
| HCC160 | Internal Injuries |
| HCC161 | Traumatic Amputation |
| HCC164 | Major Complications of Medical Care and Trauma |
| HCC168 | Extremely Low Birthweight Neonates |
| HCC169 | Very Low Birthweight Neonates |
| HCC170 | Serious Perinatal Problem Affecting Newborn (See HCC212) |
| HCC171 | Other Perinatal Problems Affecting Newborn |
| HCC172 | Normal, Single Birth |
| HCC174 | Major Organ Transplant Status (See HCC213) |
| HCC175 | Other Organ Transplant/Replacement |
| HCC176 | Artificial Openings for Feeding or Elimination |
| HCC177 | Amputation Status, Lower Limb/Amputation Complications |
| HCC180 | Radiation Therapy |
| HCC181 | Chemotherapy |
| HCC182 | Rehabilitation |
| HCC201 | Bacteremia |
| HCC202 | Secondary Cancer Except Lymph Node |
| HCC203 | Secondary Cancer of Lymph Node |
| HCC204 | Cancer of the Brain/Nervous System/Pituitary, Pineal Glands |
| HCC205 | Acute Leukemia |
| HCC206 | Spinal Stenosis |
| HCC207 | Hemophilia |
| HCC208 | Hereditary Hemolytic Anemias and Coagulation Defects |
| HCC209 | Toxic/Unspecified Encephalopathy |
| HCC210 | Post Trauma/Surgery Pulmonary Insufficiency, Including Adult Respiratory Distress Syndrome |
| HCC211 | Acute Renal Failure |
| HCC212 | Low Birthweight (15-2499 grams) or Unspecified |
| HCC213 | Bone Marrow Transplant Status/Complications |