I. Background

The Centers for Medicare & Medicaid Services (CMS) maintains, re-evaluates and implements changes to the OASIS data item set and also develops, implements, maintains and re-evaluates quality measures that are reflective of quality of care provided by home health agencies (HHAs) in the home setting. For outcome measures, the re-evaluation process includes evaluating and updating, as needed, the risk adjustment models used to adjust for patient characteristics at admission, to ensure they are adequately robust and allow for valid comparison across providers. OASIS-based home health outcome measures are risk-adjusted using OASIS items that are statistically significant and clinical relevant predictors of the outcome.

In the CY2018 Home Health Prospective Payment System (HH PPS) final rule (82 FR 51715), CMS finalized removal of 70 data elements from 24 OASIS items collected at the start or resumption of a care episode, some of which were used in the risk adjustment models for OASIS-based outcome measures. As a result, the risk adjustment models required recalibrating to include only OASIS items that will be present on OASIS-D, which has an effective date of January 1, 2019. More information on item removals by OASIS data collection time point is available here.

The OASIS-based outcome measures for which the updated risk adjustment models apply starting January 1, 2019 are:

- Improvement in Ambulation/Locomotion
- Improvement in Bathing
- Improvement in Bed Transferring
- Improvement in Bowel Incontinence
- Improvement in Confusion Frequency
- Improvement in Dyspnea
- Improvement in Lower Body Dressing
- Improvement in Upper Body Dressing
- Improvement in Management of Oral Medications
- Improvement in Pain Interfering with Activity
- Improvement in Status of Surgical Wounds
- Improvement in Toilet Transferring
- Discharge to Community

Section II describes the technical steps for calculating risk adjusted measures and describes the development the risk adjustment models. Section III contains the detailed specifications for each of the risk factors used in the risk adjustment models.

The document Recalibrated Risk Adjustment Model_Risk Factors_Model Fit_Coefficients.pdf contains the list of risk factors, model fit statistics, and the estimated covariate coefficients for each measure.
II. Technical Approach

Calculating Risk Adjusted Quality Measures

The following steps are used to calculate the each quality measure:

A. Calculate the agency observed score (steps 1 through 3)

**Step 1.** Calculate the denominator count:

Calculate the total number of quality episodes with a selected target OASIS assessment in the measure time window that do not meet the exclusion criteria following each measure’s specifications.\(^1\)

**Step 2.** Calculate the numerator count:

Calculate the total number of quality episodes in the denominator whose OASIS assessments indicates meeting numerator criteria, following each measure’s specifications.

**Step 3.** Calculate the agency’s observed rate:

Divide the agency’s numerator count by its denominator count to obtain the agency’s observed rate; that is, divide the result of **step 2** by the result of **step 1**.

B. Calculate the predicted rate for each quality episode (steps 4 and 5)

**Step 4.** Determine presence or absence of the risk factors for each patient (technical specifications for risk factors are in Section III):

If dichotomous risk factor covariates are used, assign covariate values, either ‘0’ for covariate condition not present or ‘1’ for covariate condition present, for each quality episode for each of the covariates as reported at SOC/ROC, as described in the section above.

**Step 5.** Calculate the predicted rate for each quality episode with the following formula:

\[ \text{Episode-level predicted QM rate} = \frac{1}{1+e^{-X}} \]

Where \( e \) is the base of natural logarithms and \( X \) is a linear combination of the constant and the logistic regression coefficients times the covariate scores (from Formula [2], below).

\[ \text{Quality measure triggered (yes=1, no=0)} = B_0 + B_1 \times \text{COVA} + B_2 \times \text{COVB} + ... B_N \times \text{COVN} \]

Where \( B_0 \) is the logistic regression constant, \( B_1 \) is the logistic regression coefficient for the first covariate, \( \text{COVA} \) is the episode-level rate for the first covariate, \( B_2 \) is the logistic regression coefficient for the second covariate, and \( \text{COVB} \) is the episode-level rate for the second

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covariate, etc. The regression constant and regression coefficients are provided in *Recalibrated Risk Adjustment Model_Risk Factors_Model Fit_Coefficients.pdf*. ²

C. Calculate the agency predicted rate (step 6)

**Step 6.** Once a predicted QM rate has been calculated for all quality episodes, calculate the mean agency-level predicted QM rate by averaging all episode-level predicted values for that agency.

D. Calculate national predicted rate (step 7)

**Step 7.** Calculate the national predicted rate:

Once a predicted QM value has been calculated for all episodes, calculate the mean national-level predicted QM rate by averaging all episode-level predicted values. Note that the sample will include only those quality episodes with non-missing data for the component covariates.

E. Calculate the agency’s risk-adjusted rate (step 8)

**Step 8.** Calculate the agency-level risk-adjusted rate based on the: agency-level observed quality measure rate (step 3), agency-level mean predicted quality measure rate (step 6), and national mean predicted QM rate (step 7), using the following formula: agency risk adjusted rate = agency observed rate + national predicted rate – agency predicted rate

If the adjusted rate is greater than 100%, the adjusted rate is set to 100%. Similarly, if the result is a negative number the adjusted rate is set to zero

**Identifying Risk Factors**

The risk adjustment model was developed using OASIS national repository data from assessments submitted between January 1, 2016 and December 31, 2016 (~6.4 million episodes of care). The population of 6.4 million episodes for calendar year 2016 was split in half such that 3.2 million episodes were used as a developmental sample and 3.2 million episodes were used as a validation sample. The following process was used to identify unique contributing risk factors to the prediction model:

1. Risk factors were identified based on OASIS items that will remain following the OASIS-D transition. The statistical properties of the items were examined to specify risk factors (e.g., item responses were grouped when there was low prevalence of certain responses). Team clinicians then reviewed all risk factors for clinical relevance and redefined or updated risk factors as necessary. These risk factors were divided into 35 content focus groups (e.g., functional status, ICD 10-based conditions, etc.). Where possible, risk factors were defined such that they flagged mutually exclusive subgroups within each content focus group. When modelling these risk factors, the exclusion category was set to be either the risk factor flag for most independent or the most frequent within each content focus group.

2. A logistic regression specification was used to estimate coefficients among the full set of candidate risk factors. Those risk factors that are statistically significant at probability <0.001 are kept for further review.

3. The list of risk factors that achieved the probability <0.001 level were reviewed. For content focus groups that are explicitly tiered by increasing severity, either all risk factors are included within a content focus group or none of them. For example, if response option levels 1 and 2 for M1800 Grooming were statistically significant at probability <0.001 for a particular outcome, then response option level 3 for M1800 Grooming was added to the list even if it was not statistically significant. If none of the risk factors within an explicitly tiered content focus group is statistically significant at <0.001, the entire content focus group is removed from the model.

4. A logistic regression was computed on the list of risk factors that had achieved probability <0.001 in Step 3 above.

5. Goodness of fit statistics (McFadden’s R² and C-statistic) were calculated to measure how well the predicted values generated by the prediction model were related to the actual outcomes. Separate bivariate correlations were constructed between the risk factors and the outcomes to confirm the sign and strength of the estimated coefficients in the logistic model.

6. The initial model was reviewed by a team of at least three experienced home health clinicians. Each risk factor was reviewed for its clinical plausibility. Clinicians were asked about the direction indicated by the coefficient in the risk adjustment model and how it compares to their perceived bivariate relationship given their experience treating patients in the home. Risk factors that were not clinically plausible were revised or eliminated if revisions were not possible.

7. The risk factors that were deemed not clinically plausible were revised or eliminated, and Steps 3, 4, and 5 in this process were repeated. The resulting logistic regression equation was designated as the risk adjustment model for the outcome.

8. The risk adjustment model was applied to the validation sample and goodness of fit statistics were computed. The statistics were similar to the goodness of fit statistics computed with the development sample. As additional testing, HHAs were stratified across several observable characteristics, and the distributions of the risk-adjusted outcomes were checked to confirm that values remained similar across strata.
III. Risk Factor Technical Specifications

OASIS data items are referred to in this documentation using field names specified in OASIS Data Submission Specifications published by CMS. "[1]" is appended to the field name if the value is taken from the beginning of episode assessment (Start or Resumption of Care), and "[2]" is appended if the value is to be taken from the assessment conducted at the end of the episode (Discharge, Transfer, or Death).

1. Age

IF M0100_ASSMT_REASON[1] = 01 THEN
    IF MONTH(M0030_START_CARE_DT[1]) > MONTH(M0066_PAT_BIRTH_DT[1]) OR
    (MONTH(M0030_START_CARE_DT[1]) = MONTH(M0066_PAT_BIRTH_DT[1]) AND
    DAY(M0030_START_CARE_DT[1]) >= DAY(M0066_PAT_BIRTH_DT[1])) THEN
        AGE = YEAR(M0030_START_CARE_DT[1]) – YEAR(M0066_PAT_BIRTH_DT[1])
    ELSE
        AGE = YEAR(M0030_START_CARE_DT[1]) – YEAR(M0066_PAT_BIRTH_DT[1])-1
    END IF
ELSE
    IF MONTH(M0032_ROC_DT[1]) > MONTH(M0066_PAT_BIRTH_DT[1]) OR
    (MONTH(M0032_ROC_DT[1]) = MONTH(M0066_PAT_BIRTH_DT[1]) AND
    DAY(M0032_ROC_DT[1]) >= DAY(M0066_PAT_BIRTH_DT[1])) THEN
        AGE = YEAR(M0032_ROC_DT[1]) – YEAR(M0066_PAT_BIRTH_DT[1])
    ELSE
        AGE = YEAR(M0032_ROC_DT[1]) – YEAR(M0066_PAT_BIRTH_DT[1])-1
    END IF
END IF

Age: 0-54
IF (AGE >= 18 AND AGE <= 54) THEN
    AGE_0_54 = 1
ELSE
    AGE_0_54 = 0
END IF

Age: 55-59
IF (AGE >= 55 AND AGE <= 59) THEN
    AGE_55_59 = 1
ELSE
    AGE_55_59 = 0
END IF
\textbf{Age: 60-64} 
IF \( \text{AGE} \geq 60 \ \text{AND} \ \text{AGE} \leq 64 \) 
THEN 
\quad \text{AGE}_{60\text{-}64} = 1 
ELSE 
\quad \text{AGE}_{60\text{-}64} = 0 
END IF 

\textbf{Age: 65-69} 
IF \( \text{AGE} \geq 65 \ \text{AND} \ \text{AGE} \leq 69 \) 
THEN 
\quad \text{AGE}_{65\text{-}69} = 1 
ELSE 
\quad \text{AGE}_{65\text{-}69} = 0 
END IF 

\textbf{Age: 70-74} 
IF \( \text{AGE} \geq 70 \ \text{AND} \ \text{AGE} \leq 74 \) 
THEN 
\quad \text{AGE}_{70\text{-}74} = 1 
ELSE 
\quad \text{AGE}_{70\text{-}74} = 0 
END IF 

\textbf{Age: 75-79} 
IF \( \text{AGE} \geq 75 \ \text{AND} \ \text{AGE} \leq 79 \) 
THEN 
\quad \text{AGE}_{75\text{-}79} = 1 
ELSE 
\quad \text{AGE}_{75\text{-}79} = 0 
END IF 

\textbf{Age: 80-84} 
IF \( \text{AGE} \geq 80 \ \text{AND} \ \text{AGE} \leq 84 \) 
THEN 
\quad \text{AGE}_{80\text{-}84} = 1 
ELSE 
\quad \text{AGE}_{80\text{-}84} = 0 
END IF 

\textbf{Age: 85-89} 
IF \( \text{AGE} \geq 85 \ \text{AND} \ \text{AGE} = 89 \) 
THEN 
\quad \text{AGE}_{85\text{-}89} = 1 
ELSE 
\quad \text{AGE}_{85\text{-}89} = 0 
END IF
**Age: 90-94**
IF (AGE >= 90 AND AGE <= 94) THEN
   AGE_90_94 = 1
ELSE
   AGE_90_94 = 0
END IF

**Age: 95+**
IF (AGE >= 95) THEN
   AGE_95PLUS = 1
ELSE
   AGE_95PLUS = 0
END IF

2. Gender
IF M0069_PAT_GENDER[1] = 2 THEN
   GENDER = 1
ELSE
   GENDER = 0
END IF

*Patient is Female*
IF GENDER = 1 THEN
   GENDER_FEMALE = 1
ELSE
   GENDER_FEMALE = 0
END IF

*Patient is Male*
IF GENDER = 0 THEN
   GENDER_MALE = 1
ELSE
   GENDER_MALE = 0
END IF

3. Payment Source

*Payment Source: Medicare FFS only (%)*
  PAY_MCARE_FFS = 1
ELSE
  PAY_MCARE_FFS = 0
END IF

Payment Source: Medicare HMO only (%)
  PAY_MCARE_HMO = 1
ELSE
  PAY_MCARE_HMO = 0
END IF

Payment Source: Medicare and Medicaid (%)
  PAY_MCAREANDMCAID = 1
ELSE
  PAY_MCAREANDMCAID = 0
END IF

Payment Source: Medicaid Only (%)
M0150_CPAY_TITLEPGMS[1] = 0 AND M0150_CPAY_OTH_GOV[1] = 0 AND
M0150_CPAY_PRIV_INS[1] = 0 AND M0150_CPAY_PRIV_HMO[1] = 0 AND
THEN
   PAY_MCAID_ONLY = 1
ELSE
   PAY_MCAID_ONLY = 0
END IF

Payment Source: Other Combinations (%)
IF PAY_MCARE_FFS = 0 AND PAY_MCARE_HMO = 0 AND PAY_MCAREANDMCAID = 0 AND
PAY_MCAID_ONLY = 0
THEN
   PAY_OTHER_COMBO = 1
ELSE
   PAY_OTHER_COMBO = 0
END IF

4. SOC/ROC and Admission Source

Discharged from facility in past 14 days
THEN
   INPT_FACILITY = 1
ELSE
   INPT_FACILITY = 0
END IF

Start of Care - Further visits planned : Discharged from facility in past 14 days
IF (M0100_ASSMT_REASON[1] = 01 AND INPT_FACILITY = 1)
THEN
   SOC_INPT = 1
ELSE
   SOC_INPT = 0
END IF

Start of Care - Further visits planned : Not Discharged from facility in past 14 days
IF (M0100_ASSMT_REASON[1] = 01 AND INPT_FACILITY = 0)
THEN
   SOC_COMM = 1
ELSE
   SOC_COMM = 0
END IF

Resumption of care (after inpatient stay)
IF (M0100_ASSMT_REASON[1] = 3)
THEN
   \text{ROC} = 1
ELSE
   \text{ROC} = 0
END IF

5. Post-Acute Facility Admission Source

\textit{Not discharged from post-acute facility past 14 days}
IF \text{M1000\_DC\_SNF\_14\_DA[1]} = 1 OR \text{M1000\_DC\_IRF\_14\_DA[1]} = 1 OR \text{M1000\_DC\_NF\_14\_DA[1]} = 1 OR \text{M1000\_DC\_LTCH\_14\_DA[1]} = 1 OR \text{M1000\_DC\_PSYCH\_14\_DA[1]} = 1
THEN
   \text{INPT\_NOPOSTACUTE} = 0
ELSE
   \text{INPT\_NOPOSTACUTE} = 1
END IF

\textit{Discharged from post-acute facility past 14 days}
IF \text{M1000\_DC\_SNF\_14\_DA[1]} = 1 OR \text{M1000\_DC\_IRF\_14\_DA[1]} = 1 OR \text{M1000\_DC\_NF\_14\_DA[1]} = 1 OR \text{M1000\_DC\_LTCH\_14\_DA[1]} = 1 OR \text{M1000\_DC\_PSYCH\_14\_DA[1]} = 1
THEN
   \text{INPT\_POSTACUTE} = 1
ELSE
   \text{INPT\_POSTACUTE} = 0
END IF

6. IV Therapies

\textit{Receiving any nutrition or infusion therapy}
IF \text{M1030\_THH\_PAR\_NUTRITION[1]} = 1 OR \text{M1030\_THH\_ENT\_NUTRITION[1]} = 1 OR \text{M1030\_THH\_IV\_INFUSION[1]} = 1
THEN
   \text{IVTHER\_ANY} = 1
ELSE
   \text{IVTHER\_ANY} = 0
END IF

\textit{None of the Above}
IF \text{M1030\_THH\_NONE\_ABOVE[1]} = 1
THEN
   \text{IVTHER\_NONE} = 1
ELSE
   \text{IVTHER\_NONE} = 0
END IF
7. Risk of Hospitalization

Risk of Hospitalization: History of falls in past 12 months (%)
IF M1033_HOSP_RISK_HSTRY_FALLS[1] = 1
THEN
RISK_HSTRY_FALLS = 1
ELSE
RISK_HSTRY_FALLS = 0
END IF

Risk of Hospitalization: Unintentional weight loss in past 12 months (%)
IF M1033_HOSP_RISK_WEIGHTLOSS[1] = 1
THEN
RISK_WEIGHTLOSS = 1
ELSE
RISK_WEIGHTLOSS = 0
END IF

Risk of Hospitalization: Multiple hospitalizations in past 6 months (%)
IF M1033_HOSP_RISK_MLTPL_HOSPZTN[1] = 1
THEN
RISK_MLTPL_HOSPZTN = 1
ELSE
RISK_MLTPL_HOSPZTN = 0
END IF

Risk of Hospitalization: Multiple ED visits in past 6 months (%)
IF M1033_HOSP_RISK_MLTPL_ED_VISIT[1] = 1
THEN
RISK_ED = 1
ELSE
RISK_ED = 0
END IF

Risk of Hospitalization: Recent decline mental/emotional decline in past 3 months (%)
IF M1033_HOSP_RISK_MNTL_BHV_DCLN[1] = 1
THEN
RISK_RCNT_DCLN = 1
ELSE
RISK_RCNT_DCLN = 0
END IF

Risk of Hospitalization: Difficulty complying with medical instruction in past 3 months (%)
IF M1033_HOSP_RISK_COMPLIANCE[1] = 1
THEN
RISK_COMPLY = 1
ELSE
RISK_COMPLY = 0
END IF
END IF

*Risk of Hospitalization: Taking five or more medications (%)*
IF M1033_HOSP_RISK_5PLUS_MDCTN[1] = 1
THEN
   RISK_5PLUS_MDCTN = 1
ELSE
   RISK_5PLUS_MDCTN = 0
END IF

*Risk of Hospitalization: Reports Exhaustion (%)*
IF M1033_HOSP_RISK_CRNT_EXHSTN[1] = 1
THEN
   RISK_EXHAUST = 1
ELSE
   RISK_EXHAUST = 0
END IF

*Risk of Hospitalization: Other unlisted risk factors (%)*
IF M1033_HOSP_RISK_OTHR_RISK[1] = 1
THEN
   RISK_OTHR = 1
ELSE
   RISK_OTHR = 0
END IF

*Risk of Hospitalization: None of the Above (%)*
IF M1033_HOSP_RISK_NONE_ABOVE[1] = 1
THEN
   RISK_NONE = 1
ELSE
   RISK_NONE = 0
END IF

8. Availability of Assistance

*Availability of Assistance*

*Around the clock (%)*
THEN
   ASSIST_ARND_CLOCK = 1
ELSE
   ASSIST_ARND_CLOCK = 0
END IF

*Regular daytime (%)*
    ASSIST_REGDAY = 1
ELSE
    ASSIST_REGDAY = 0
END IF

Regular nighttime (%)
    ASSIST_REGNITE = 1
ELSE
    ASSIST_REGNITE = 0
END IF

Occasional/None (%)
    ASSIST_OCC_NONE = 1
ELSE
    ASSIST_OCC_NONE = 0
END IF

Living Arrangement
Lives alone (%)
    LIV_ALONE = 1
ELSE
    LIV_ALONE = 0
END IF

Lives with Others (%)
    LIV_OTHERS = 1
ELSE
    LIV_OTHERS = 0
END IF
**Lives in a Congregate Situation (%)**


THEN

LIV_CONGREGATE = 1

ELSE

LIV_CONGREGATE = 0

END IF

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**9. Pain**

**Frequency of Pain: No Pain**

IF (M1242_PAIN ACTVTY MVMT[1] = 00)

THEN

PAIN0 = 1

ELSE

PAIN0 = 0

END IF

**Frequency of Pain: Pain does not interfere with activity**

IF (M1242_PAIN ACTVTY MVMT[1] = 01)

THEN

PAIN1 = 1

ELSE

PAIN1 = 0

END IF

**Frequency of Pain: Less often than daily**

IF (M1242_PAIN ACTVTY MVMT[1] = 02)

THEN

PAIN2 = 1

ELSE

PAIN2 = 0

END IF

**Frequency of Pain: Daily, but not constant**

IF (M1242_PAIN ACTVTY MVMT[1] = 03)

THEN

PAIN3 = 1

ELSE

PAIN3 = 0

END IF

**Frequency of Pain: Constant**

IF (M1242_PAIN ACTVTY MVMT[1] = 04)
THEN
  PAIN4 = 1
ELSE
  PAIN4 = 0
END IF

10. Pressure Ulcers

None or Stage I Present
IF M1306_UNHLD_STG2_PRSR_ULCR[1] = 00 AND
(M1322_NBR_PRSULC_STG1[1] = 00 OR M1322_NBR_PRSULC_STG1[1] = 01 OR
M1322_NBR_PRSULC_STG1[1] = 02 OR M1322_NBR_PRSULC_STG1[1] = 03 OR
M1322_NBR_PRSULC_STG1[1] = 04)
THEN
  PU_NONE_STG1ONLY = 1
ELSE
  PU_NONE_STG1ONLY = 0
END IF

Stage II or Higher and Unstageable Present
IF M1311_NBR_PRSULC_STG2_A1[1] > 0 OR M1311_NBR_PRSULC_STG3_B1[1] > 0 OR
M1311_NBR_PRSULC_STG4_C1[1] > 0 OR M1311_NSTG_DRSG_D1[1] > 0 OR
M1311_NSTG_CVRG_E1[1] > 0 OR M1311_DEEP_TSUE_F1[1] > 0
THEN
  PU_STG2PLUS_UNSTG = 1
ELSE
  PU_STG2PLUS_UNSTG = 0
END IF

11. Stasis Ulcers

Stasis Ulcer: No observable stasis ulcers
IF M1330_STAS_ULCR_PRSNT[1] = 00 OR M1330_STAS_ULCR_PRSNT[1] = 03
THEN
  STAS_ULCR_NONE = 1
ELSE
  STAS_ULCR_NONE = 0
END IF

Stasis Ulcer: 1 observable stasis ulcer only
IF M1332_NBR_STAS_ULCR[1] = 1
THEN
  STAS_ULCR_OBS_1 = 1
ELSE
  STAS_ULCR_OBS_1 = 0
END IF
Stasis Ulcer: Multiple observable stasis ulcers
THEN
   STAS_ULCR_OBS_2PLUS = 1
ELSE
   STAS_ULCR_OBS_2PLUS = 0
END IF

12. Surgical Wounds

Status of Surgical Wound: None
IF M1342_STUS_PRBLM_SRGCL_WND[1] = MISSING
THEN
   SRG_WND_OBS_NONE = 1
ELSE
   SRG_WND_OBS_NONE = 0
END IF

Status of Surgical Wound: Newly Epithelialized
IF M1342_STUS_PRBLM_SRGCL_WND[1] = 00
THEN
   SRG_WND_OBS_EPI = 1
ELSE
   SRG_WND_OBS_EPI = 0
END IF

Status of Surgical Wound: Fully granulating or early/partial granulation
IF M1342_STUS_PRBLM_SRGCL_WND[1] = 01 OR M1342_STUS_PRBLM_SRGCL_WND[1] = 02
THEN
   SRG_WND_OBS_GRAN = 1
ELSE
   SRG_WND_OBS_GRAN = 0
END IF

Status of Surgical Wound: Not healing
IF M1342_STUS_PRBLM_SRGCL_WND[1] = 03
THEN
   SRG_WND_OBS_NOHEAL = 1
ELSE
   SRG_WND_OBS_NOHEAL = 0
END IF

13. Dyspnea

Dyspnea: Not short of breath
IF (M1400_WHEN_DYSPNEIC[1] = 00)
THEN
DYSP0 = 1
ELSE
DYSP0 = 0
END IF

Dyspnea: Walking more than 20 feet, climbing stairs
IF (M1400_WHEN_DYSPNEIC[1] = 01)
THEN
DYSP1 = 1
ELSE
DYSP1 = 0
END IF

Dyspnea: Moderate exertion
IF (M1400_WHEN_DYSPNEIC[1] = 02)
THEN
DYSP2 = 1
ELSE
DYSP2 = 0
END IF

Dyspnea: Minimal to no exertion
THEN
DYSP34 = 1
ELSE
DYSP34 = 0
END IF

14. Urinary Status

Urinary incontinence/catheter: None
IF M1610_UR_INCONT[1] = 00
THEN
URINCONT_NONE = 1
ELSE
URINCONT_NONE = 0
END IF

Urinary incontinence/catheter: Incontinent
IF M1610_UR_INCONT[1] = 01
THEN
URINCONT_INCONT = 1
ELSE
URINCONT_INCONT = 0
END IF
**Urinary incontinence/catheter: Catheter**

IF M1610_UR_INCONT[1] = 02  
THEN  
    URINCONT_CATH = 1  
ELSE  
    URINCONT_CATH = 0  
END IF

**15. Bowel Incontinence**

*Bowel incontinence Frequency: Never or Very Rare*

IF M1620_BWL_INCONT[1] = 00 OR M1620_BWL_INCONT[1] = UK  
THEN  
    BWL_NONE_UK = 1  
ELSE  
    BWL_NONE_UK = 0  
END IF

*Bowel incontinence Frequency: Less than once a week*

IF M1620_BWL_INCONT[1] = 01  
THEN  
    BWL_FR1 = 1  
ELSE  
    BWL_FR1 = 0  
END IF

*Bowel incontinence Frequency: One to Three times a week*

IF M1620_BWL_INCONT[1] = 02  
THEN  
    BWL_FR2 = 1  
ELSE  
    BWL_FR2 = 0  
END IF

*Bowel incontinence Frequency: Four to six times a week or more*

THEN  
    BWL_FR345 = 1  
ELSE  
    BWL_FR345 = 0  
END IF

*Bowel incontinence Frequency: Ostomy for bowel elimination*

IF M1620_BWL_INCONT[1] = NA  
THEN  
    BWL_OSTOMY = 1  
ELSE  

16. Cognitive function

_Cognitive Functioning: Alert and focused_
IF M1700_COG_FUNCTION[1] = 00
THEN
   COGN0 = 1
ELSE
   COGN0 = 0
END IF

_Cognitive Functioning: Requires prompting under stress_
IF M1700_COG_FUNCTION[1] = 01
THEN
   COGN1 = 1
ELSE
   COGN1 = 0
END IF

_Cognitive Functioning: Requires assist in special circumstances_
IF M1700_COG_FUNCTION[1] = 02
THEN
   COGN2 = 1
ELSE
   COGN2 = 0
END IF

_Cognitive Functioning: Requires considerable assist/totally dependent_
THEN
   COGN34 = 1
ELSE
   COGN34 = 0
END IF

17. Confusion

_Confused: Never_
THEN
   CONF0 = 1
ELSE
   CONF0 = 0
END IF
Confused: In new or complex situations
IF M1710_WHEN_CONFUSED[1] = 01 THEN
    CONF1 = 1
ELSE
    CONF1 = 0
END IF

Confused: Sometimes
    CONF23 = 1
ELSE
    CONF23 = 0
END IF

Confused: Constantly
IF M1710_WHEN_CONFUSED[1] = 04 THEN
    CONF4 = 1
ELSE
    CONF4 = 0
END IF

18. Anxiety

Anxiety: None of the time
IF M1720_WHEN_ANXIOUS[1] = 00 OR M1720_WHEN_ANXIOUS[1] = NA THEN
    ANX0 = 1
ELSE
    ANX0 = 0
END IF

Anxiety: Less often than daily
IF M1720_WHEN_ANXIOUS[1] = 01 THEN
    ANX1 = 1
ELSE
    ANX1 = 0
END IF

Anxiety: Daily, but not constantly
IF M1720_WHEN_ANXIOUS[1] = 02 THEN
    ANX2 = 1
ELSE
    ANX2 = 0
END IF
ANX2 = 0
END IF

Anxiety: All of the time
IF M1720_WHEN_ANXIOUS[1] = 03
THEN
  ANX3 = 1
ELSE
  ANX3 = 0
END IF

19. Depression Screening (PHQ-2 Score)
Set PHQ-2 scores to missing value for episodes without PHQ-2 Screenings
THEN
  M1730_PHQ2_LACK_INTRST[1] = .
  M1730_PHQ2_DPRSN[1] = .
END IF

No PHQ-2 Screen or Unable to Respond
THEN
  PHQ2_NA = 1
ELSE
  PHQ2_NA = 0
END IF

PHQ-2 Score: 3-6
IF PHQ2_NA = 1
THEN
  PHQ2_SCOR_3PLUS = 0
ELSE
  IF (VAL(M1730_PHQ2_DPRSN[1]) + VAL(M1730_PHQ2_LACK_INTRST[1])) >= 3 OR M1730_STDZ_DPRSN_SCRNG = 2
  THEN
    PHQ2_SCOR_3PLUS = 1
  ELSE
    PHQ2_SCOR_3PLUS = 0
  END IF
END IF

PHQ-2 Score: 1 or 2
IF PHQ2_NA = 1
THEN
PHQ2_SCOR_12 = 0
ELSE
  IF (VAL(M1730_PHQ2_DPRSN[1]) + VAL(M1730_PHQ2_LACK_INTRST [1])) = 1 OR
      (VAL(M1730_PHQ2_DPRSN[1]) + VAL(M1730_PHQ2_LACK_INTRST [1])) = 2
    THEN
      PHQ2_SCOR_12 = 1
    ELSE
      PHQ2_SCOR_12 = 0
    END IF
END IF

PHQ-2 Score: 0 or alt screen does not indicate further evaluation
IF PHQ2_NA = 1
THEN
  PHQ2_SCOR_0  = 0
ELSE
  IF (VAL(M1730_PHQ2_DPRSN[1]) + VAL(M1730_PHQ2_LACK_INTRST [1])) = 0 OR
      M1730_STDZ_DPRSN_SCRNG[1] = 03
    THEN
      PHQ2_SCOR_0 = 1
    ELSE
      PHQ2_SCOR_0 = 0
    END IF
END IF

20. Behavioral Symptoms

Behavioral: None
IF M1740_BD_NONE[1] = 01
THEN
  BEHAV_NONE = 1
ELSE
  BEHAV_NONE = 0
END IF

Behavioral: Memory Deficit
IF M1740_BD_MEM_DEFICIT[1] = 01
THEN
  BEHAV_MEM_DEFICIT = 1
ELSE
  BEHAV_MEM_DEFICIT = 0
END IF

Behavioral: Impaired decision making
IF M1740_BD_IMP_DECISN[1] = 01
THEN
  BEHAV_IMPR_DECISN = 1
ELSE

BEHAV_IMPDECISION = 0
END IF

Behavioral: Verbally disruptive, physical aggression, disruptive, or delusional
IF M1740_BD_VERBAL[1] = 01 OR M1740_BD_PHYSICAL[1] = 01 OR
THEN

BEHAV_OTHR = 1
ELSE

BEHAV_OTHR = 0
END IF

21. Disruptive Behavior Frequency

Frequency of Disruptive Behavior: Never
IF M1745_BEH_PROB_FREQ[1] = 00
THEN

BEHPFR0 = 1
ELSE

BEHPFR0 = 0
END IF

Frequency of Disruptive Behavior: Once a month or less
IF M1745_BEH_PROB_FREQ[1] = 01 OR M1745_BEH_PROB_FREQ[1] = 02
THEN

BEHPFR12 = 1
ELSE

BEHPFR12 = 0
END IF

Frequency of Disruptive Behavior: Several times a month
IF M1745_BEH_PROB_FREQ[1] = 03
THEN

BEHPFR3 = 1
ELSE

BEHPFR3 = 0
END IF

Frequency of Disruptive Behavior: Several times a week
IF M1745_BEH_PROB_FREQ[1] = 4
THEN

BEHPFR4 = 1
ELSE

BEHPFR4 = 0
END IF
Frequency of Disruptive Behavior: At least once daily
IF M1745_BEH_PROB_FREQ[1] = 5 THEN
    BEHPFR5 = 1
ELSE
    BEHPFR5 = 0
END IF

22. Grooming

Grooming: Able to groom self unaided
IF M1800_CRNT_GROOMING[1] = 00 THEN
    GROOM0 = 1
ELSE
    GROOM0 = 0
END IF

Grooming: Grooming utensils must be placed within reach
IF M1800_CRNT_GROOMING[1] = 01 THEN
    GROOM1 = 1
ELSE
    GROOM1 = 0
END IF

Grooming: Assistance needed
IF M1800_CRNT_GROOMING[1] = 02 THEN
    GROOM2 = 1
ELSE
    GROOM2 = 0
END IF

Grooming: Entirely dependent upon someone else
IF M1800_CRNT_GROOMING[1] = 03 THEN
    GROOM3 = 1
ELSE
    GROOM3 = 0
END IF

23. Upper Body Dressing

Ability to Dress Upper Body: No help needed
IF M1810_CRNT_DRESS_UPPER[1] = 00 THEN
    UPPER0 = 1
ELSE
    UPPER0 = 0
END IF

\textit{Ability to Dress Upper Body: Needs clothing laid out}
IF M1810\_CRNT\_DRESS\_UPPER[1] = 01
THEN
    UPPER1 = 1
ELSE
    UPPER1 = 0
END IF

\textit{Ability to Dress Upper Body: Needs assistance needed putting on clothing}
IF M1810\_CRNT\_DRESS\_UPPER[1] = 02
THEN
    UPPER2 = 1
ELSE
    UPPER2 = 0
END IF

\textit{Ability to Dress Upper Body: Entirely dependent upon someone else}
IF M1810\_CRNT\_DRESS\_UPPER[1] = 03
THEN
    UPPER3 = 1
ELSE
    UPPER3 = 0
END IF

24. Lower Body Dressing

\textit{Ability to Dress Lower Body: No help needed}
IF M1820\_CRNT\_DRESS\_LOWER[1] = 00
THEN
    LOWER0 = 1
ELSE
    LOWER0 = 0
END IF

\textit{Ability to Dress Lower Body: Needs clothing/shoes laid out}
IF M1820\_CRNT\_DRESS\_LOWER[1] = 01
THEN
    LOWER1 = 1
ELSE
    LOWER1 = 0
END IF

\textit{Ability to Dress Lower Body: Assist needed putting on clothing}
IF M1820_CRNT_DRESS_LOWER[1] = 02
THEN
  LOWER2 = 1
ELSE
  LOWER2 = 0
END IF

*Ability to Dress Lower Body: Entirely dependent upon someone else*

IF M1820_CRNT_DRESS_LOWER[1] = 03
THEN
  LOWER3 = 1
ELSE
  LOWER3 = 0
END IF

25. Bathing

*Bathing: Independently in shower/tub*
IF M1830_CRNT_BATHING[1] = 00
THEN
  BATH0 = 1
ELSE
  BATH0 = 0
END IF

*Bathing: With the use of devices in shower/tub*
IF M1830_CRNT_BATHING[1] = 01
THEN
  BATH1 = 1
ELSE
  BATH1 = 0
END IF

*Bathing: With intermittent assistance in shower/tub*
IF M1830_CRNT_BATHING[1] = 02
THEN
  BATH2 = 1
ELSE
  BATH2 = 0
END IF

*Bathing: Participates with supervision in shower/tub*
IF M1830_CRNT_BATHING[1] = 03
THEN
  BATH3 = 1
ELSE
  BATH3 = 0
END IF
END IF

_Bathing: Independent at sink, in chair, or on commode_
IF M1830_CRNT_BATHING[1] = 04
THEN
   BATH4 = 1
ELSE
   BATH4 = 0
END IF

_Bathing: Participates with assist at sink, in chair, or commode_
IF M1830_CRNT_BATHING[1] = 05
THEN
   BATH5 = 1
ELSE
   BATH5 = 0
END IF

_Bathing: Unable to participate; bathed totally by another_
IF M1830_CRNT_BATHING[1] = 06
THEN
   BATH6 = 1
ELSE
   BATH6 = 0
END IF

26. Toilet Transferring

_Toilet Transferring: No assistance needed_
IF M1840_CRNT_TOILTG[1] = 00
THEN
   TLTTRN0 = 1
ELSE
   TLTTRN0 = 0
END IF

_Toilet Transferring: To/from/on/off toilet with human assist_
IF M1840_CRNT_TOILTG[1] = 01
THEN
   TLTTRN1 = 1
ELSE
   TLTTRN1 = 0
END IF

_Toilet Transferring: Able to self-transfer to bedside commode_
IF M1840_CRNT_TOILTG[1] = 02
THEN
TLTTRN2 = 1
ELSE
    TLTTRN2 = 0
END IF

Toilet Transferring: Unable to transfer to/from toilet or commode
THEN
    TLTTRN34 = 1
ELSE
    TLTTRN34 = 0
END IF

27. Toilet Hygiene

Toilet Hygiene Assistance: None needed
IF M1845_CRNT_TOILTG_HYGN[1] = 00
THEN
    TLTHYG0 = 1
ELSE
    TLTHYG0 = 0
END IF

Toilet Hygiene Assistance: Needs supplies laid out
IF M1845_CRNT_TOILTG_HYGN[1] = 01
THEN
    TLTHYG1 = 1
ELSE
    TLTHYG1 = 0
END IF

Toilet Hygiene Assistance: Needs assistance
IF M1845_CRNT_TOILTG_HYGN[1] = 02
THEN
    TLTHYG2 = 1
ELSE
    TLTHYG2 = 0
END IF

Toilet Hygiene Assistance:
IF M1845_CRNT_TOILTG_HYGN[1] = 03
THEN
    TLTHYG3 = 1
ELSE
    TLTHYG3 = 0
END IF
28. Transferring

Transferring: No assistance needed
IF M1850_CRNT_TRNSFRNG[1] = 00
THEN
    TRNFR0 = 1
ELSE
    TRNFR0 = 0
END IF

Transferring: With minimal human assist or with device
IF M1850_CRNT_TRNSFRNG[1] = 01
THEN
    TRNFR1 = 1
ELSE
    TRNFR1 = 0
END IF

Transferring: Bears weight and pivots only
IF M1850_CRNT_TRNSFRNG[1] = 02
THEN
    TRNFR2 = 1
ELSE
    TRNFR2 = 0
END IF

Transferring: Unable or bedfast
THEN
    TRNFR345 = 1
ELSE
    TRNFR345 = 0
END IF

29. Ambulation

Ambulation/Locomotion: Walk Independently
IF M1860_CUR_AMBLTN[1] = 00
THEN
    AMB0 = 1
ELSE
    AMB0 = 0
END IF

Ambulation/Locomotion: One-handed device on all surfaces
IF M1860_CUR_AMBLTN[1] = 01
THEN
Ambulation/Locomotion: Two-handed device/human assist on steps
IF M1860_CUR_AMBLTN[1] = 02
THEN
   AMB2 = 1
ELSE
   AMB2 = 0
END IF

Ambulation/Locomotion: Walks only with supervision or assist
IF M1860_CUR_AMBLTN[1] = 03
THEN
   AMB3 = 1
ELSE
   AMB3 = 0
END IF

Ambulation/Locomotion: Chairfast or bedfast
THEN
   AMB456 = 1
ELSE
   AMB456 = 0
END IF

30. Feeding or Eating

Eating: Independent
IF M1870_CRNT_FEEDING[1] = 0
THEN
   EAT0 = 1
ELSE
   EAT0 = 0
END IF

Eating: Requires set up, intermittent assist or modified consistency
IF M1870_CRNT_FEEDING[1] = 1
THEN
   EAT1 = 1
ELSE
   EAT1 = 0
END IF
Eating: Unable to feed self and must be assisted throughout meal
IF M1870_CRNT_FEEDING[1] = 2
THEN
   EAT2 = 1
ELSE
   EAT2 = 0
END IF

Eating: Requires tube feedings, or no nutrients orally or via tube
THEN
   EAT345 = 1
ELSE
   EAT345 = 0
END IF

31. Oral Medication Management

Management of Oral Meds: Independent
IF M2020_CRNT_MGMT_ORAL_MDCTN[1] = 00
M2020_CRNT_MGMT_ORAL_MDCTN[1] = NA OR
M2020_CRNT_MGMT_ORAL_MDCTN[1] = ^ OR
M2020_CRNT_MGMT_ORAL_MDCTN[1] = MISSING
THEN
   ORMED0 = 1
ELSE
   ORMED0 = 0
END IF

Management of Oral Meds: Advance dose prep/chart needed
IF M2020_CRNT_MGMT_ORAL_MDCTN[1] = 01
THEN
   ORMED1 = 1
ELSE
   ORMED1 = 0
END IF

Management of Oral Meds: Reminders needed
IF M2020_CRNT_MGMT_ORAL_MDCTN[1] = 02
THEN
   ORMED2 = 1
ELSE
   ORMED2 = 0
END IF

Management of Oral Meds: Unable
IF M2020_CRNT_MGMT_ORAL_MDCTN[1] = 03
THEN
ORMED3 = 1
ELSE
ORMED3 = 0
END IF

32. Injectable Medication Management

Management of Injectable Meds: Independent (excluded)
INJECT0 = 1
ELSE
INJECT0 = 0
END IF

Management of Oral Meds: Advance dose prep/chart needed
INJECTANY = 1
ELSE
INJECTANY = 0
END IF

33. Supervision and Safety Assistance

None needed
IF M2102_CARE_TYPE_SRC_SPRVSN[1] = 00 THEN
SPRVSN_NONE_NEEDED = 1
ELSE
SPRVSN_NONE_NEEDED = 0
END IF

Caregiver currently provides
IF M2102_CARE_TYPE_SRC_SPRVSN[1] = 01 THEN
SPRVSN.CG_PROVIDES = 1
ELSE
SPRVSN.CG_PROVIDES = 0
END IF

Caregiver training needed
IF M2102_CARE_TYPE_SRC_SPRVSN[1] = 02
THEN
    SPRVSN_NEED_TRAINING = 1
ELSE
    SPRVSN_NEED_TRAINING = 0
END IF

*Uncertain/unlikely to be provided*
THEN
    SPRVSN_CG_UNCERTAIN_NONE = 1
ELSE
    SPRVSN_CG_UNCERTAIN_NONE = 0
END IF

**34. Therapy Visits**

*Therapy Amounts: None*
THEN
    THER_NONE = 1
ELSE
    THER_NONE = 0
END IF

*Therapy Amounts: Low*
IF VAL(M2200_THER_NEED_NBR[1]) >= 1 AND VAL(M2200_THER_NEED_NBR[1]) < 5
THEN
    THER_LOW_LT5  = 1
ELSE
    THER_LOW_LT5  = 0
END IF

*Therapy Amounts: Medium*
IF VAL(M2200_THER_NEED_NBR[1]) >= 5 AND VAL(M2200_THER_NEED_NBR[1]) <= 13
THEN
    THER_MED_5_13  = 1
ELSE
    THER_MED_5_13  = 0
END IF

*Therapy Amounts: High*
IF VAL(M2200_THER_NEED_NBR[1]) > 13
THEN
    THER_HIGH_GT13  = 1
ELSE
    THER_HIGH_GT13  = 0
END IF
35. Home Care Diagnoses

Note: Several intermediate variables are calculated for use in the calculation of these measures.

\[
HC_{\text{DIAG1}} = M1021\text{\_PRIMARY\_DIAG\_ICD}[1] \\
HC_{\text{DIAG2}} = M1023\text{\_OTH\_DIAG1\_ICD}[1] \\
HC_{\text{DIAG3}} = M1023\text{\_OTH\_DIAG2\_ICD}[1] \\
HC_{\text{DIAG4}} = M1023\text{\_OTH\_DIAG3\_ICD}[1] \\
HC_{\text{DIAG5}} = M1023\text{\_OTH\_DIAG4\_ICD}[1] \\
HC_{\text{DIAG6}} = M1023\text{\_OTH\_DIAG5\_ICD}[1]
\]

**Infections/parasitic diseases (%)**

IF (HC_DIAG1 >= “A00” and HC_DIAG1 <= “B99”) OR (HC_DIAG2 >= “A00” and HC_DIAG2 <= “B99”) OR (HC_DIAG3 >= “A00” and HC_DIAG3 <= “B99”) OR (HC_DIAG4 >= “A00” and HC_DIAG4 <= “B99”) OR (HC_DIAG5 >= “A00” and HC_DIAG5 <= “B99”) OR (HC_DIAG6 >= “A00” and HC_DIAG6 <= “B99”)

THEN

\[HC_{\text{DX\_INFECT}} = 1\]

ELSE

\[HC_{\text{DX\_INFECT}} = 0\]

END IF

**Neoplasms (%)**

IF (HC_DIAG1 >= “C00” and HC_DIAG1 <= “D49”) OR (HC_DIAG2 >= “C00” and HC_DIAG2 <= “D49”) OR (HC_DIAG3 >= “C00” and HC_DIAG3 <= “D49”) OR (HC_DIAG4 >= “C00” and HC_DIAG4 <= “D49”) OR (HC_DIAG5 >= “C00” and HC_DIAG5 <= “D49”) OR (HC_DIAG6 >= “C00” and HC_DIAG6 <= “D49”)

THEN

\[HC_{\text{DX\_NEOPLASM}} = 1\]

ELSE

\[HC_{\text{DX\_NEOPLASM}} = 0\]

END IF

**Endocrine/nutrit./metabolic (%)**

IF (HC_DIAG1 >= “E00” and HC_DIAG1 <= “E89”) OR (HC_DIAG2 >= “E00” and HC_DIAG2 <= “E89”) OR (HC_DIAG3 >= “E00” and HC_DIAG3 <= “E89”) OR (HC_DIAG4 >= “E00” and HC_DIAG4 <= “E89”) OR (HC_DIAG5 >= “E00” and HC_DIAG5 <= “E89”) OR (HC_DIAG6 >= “E00” and HC_DIAG6 <= “E89”)

THEN

\[HC_{\text{DX\_ENDOCRINE}} = 1\]

ELSE

\[HC_{\text{DX\_ENDOCRINE}} = 0\]

END IF

**Blood diseases (%)**

IF (HC_DIAG1 >= “D50” and HC_DIAG1 <= “D89”) OR (HC_DIAG2 >= “D50” and HC_DIAG2 <= “D89”) OR (HC_DIAG3 >= “D50” and HC_DIAG3 <= “D89”) OR (HC_DIAG4 >= “D50” and HC_DIAG4 <= “D89”) OR (HC_DIAG5 >= “D50” and HC_DIAG5 <= “D89”) OR (HC_DIAG6 >= “D50” and HC_DIAG6 <= “D89”)
THEN
    HC_DX_BLOOD = 1
ELSE
    HC_DX_BLOOD = 0
END IF

\textit{Mental diseases (\%)}
IF (HC_DIAG1 >= “F01” and HC_DIAG1 <= “F99”) OR (HC_DIAG2 >= “F01” and HC_DIAG2 <= “F99”) OR (HC_DIAG3 >= “F01” and HC_DIAG3 <= “F99”) OR (HC_DIAG4 >= “F01” and HC_DIAG4 <= “F99”) OR (HC_DIAG5 >= “F01” and HC_DIAG5 <= “F99”) OR (HC_DIAG6 >= “F01” and HC_DIAG6 <= “F99”)
THEN
    HC_DX_MENTAL = 1
ELSE
    HC_DX_MENTAL = 0
END IF

\textit{Nervous system diseases (\%)}
IF (HC_DIAG1 >= “G00” and HC_DIAG1 <= “G99”) OR (HC_DIAG2 >= “G00” and HC_DIAG2 <= “G99”) OR (HC_DIAG3 >= “G00” and HC_DIAG3 <= “G99”) OR (HC_DIAG4 >= “G00” and HC_DIAG4 <= “G99”) OR (HC_DIAG5 >= “G00” and HC_DIAG5 <= “G99”) OR (HC_DIAG6 >= “G00” and HC_DIAG6 <= “G99”)
THEN
    HC_DX_NERVOUS = 1
ELSE
    HC_DX_NERVOUS = 0
END IF

\textit{Diseases of the eye (\%)}
IF (HC_DIAG1 >= “H00” and HC_DIAG1 <= “H59”) OR (HC_DIAG2 >= “H00” and HC_DIAG2 <= “H59”) OR (HC_DIAG3 >= “H00” and HC_DIAG3 <= “H59”) OR (HC_DIAG4 >= “H00” and HC_DIAG4 <= “H59”) OR (HC_DIAG5 >= “H00” and HC_DIAG5 <= “H59”) OR (HC_DIAG6 >= “H00” and HC_DIAG6 <= “H59”)
THEN
    HC_DX_EYE = 1
ELSE
    HC_DX_EYE = 0
END IF

\textit{Diseases of the ear (\%)}
IF (HC_DIAG1 >= “H60” and HC_DIAG1 <= “H95”) OR (HC_DIAG2 >= “H60” and HC_DIAG2 <= “H95”) OR (HC_DIAG3 >= “H60” and HC_DIAG3 <= “H95”) OR (HC_DIAG4 >= “H60” and HC_DIAG4 <= “H95”) OR (HC_DIAG5 >= “H60” and HC_DIAG5 <= “H95”) OR (HC_DIAG6 >= “H60” and HC_DIAG6 <= “H95”)
THEN
    HC_DX_EAR = 1
ELSE
    HC_DX_EAR = 0
END IF
**Circulatory system diseases (%)**

IF (HC_DIAG1 >= “I00” and HC_DIAG1 <= “I99”) OR (HC_DIAG2 >= “I00” and HC_DIAG2 <= “I99”) OR (HC_DIAG3 >= “I00” and HC_DIAG3 <= “I99”) OR (HC_DIAG4 >= “I00” and HC_DIAG4 <= “I99”) OR (HC_DIAG5 >= “I00” and HC_DIAG5 <= “I99”) OR (HC_DIAG6 >= “I00” and HC_DIAG6 <= “I99”) THEN

HC_DX_CIRCULATORY = 1
ELSE

HC_DX_CIRCULATORY = 0
END IF

**Respiratory system diseases (%)**

IF (HC_DIAG1 >= “J00” and HC_DIAG1 <= “J99”) OR (HC_DIAG2 >= “J00” and HC_DIAG2 <= “J99”) OR (HC_DIAG3 >= “J00” and HC_DIAG3 <= “J99”) OR (HC_DIAG4 >= “J00” and HC_DIAG4 <= “J99”) OR (HC_DIAG5 >= “J00” and HC_DIAG5 <= “J99”) OR (HC_DIAG6 >= “J00” and HC_DIAG6 <= “J99”) THEN

HC_DX_RESPIRATORY = 1
ELSE

HC_DX_RESPIRATORY = 0
END IF

**Digestive system diseases (%)**

IF (HC_DIAG1 >= “K00” and HC_DIAG1 <= “K95”) OR (HC_DIAG2 >= “K00” and HC_DIAG2 <= “K95”) OR (HC_DIAG3 >= “K00” and HC_DIAG3 <= “K95”) OR (HC_DIAG4 >= “K00” and HC_DIAG4 <= “K95”) OR (HC_DIAG5 >= “K00” and HC_DIAG5 <= “K95”) OR (HC_DIAG6 >= “K00” and HC_DIAG6 <= “K95”) THEN

HC_DX_DIGESTIVE = 1
ELSE

HC_DX_DIGESTIVE = 0
END IF

**Skin/subcutaneous diseases (%)**

IF (HC_DIAG1 >= “L00” and HC_DIAG1 <= “L99”) OR (HC_DIAG2 >= “L00” and HC_DIAG2 <= “L99”) OR (HC_DIAG3 >= “L00” and HC_DIAG3 <= “L99”) OR (HC_DIAG4 >= “L00” and HC_DIAG4 <= “L99”) OR (HC_DIAG5 >= “L00” and HC_DIAG5 <= “L99”) OR (HC_DIAG6 >= “L00” and HC_DIAG6 <= “L99”) THEN

HC_DX_SKIN = 1
ELSE

HC_DX_SKIN = 0
END IF

**Musculoskeletal sys. diseases (%)**

IF (HC_DIAG1 >= “M00” and HC_DIAG1 <= “M99”) OR (HC_DIAG2 >= “M00” and HC_DIAG2 <= “M99”) OR (HC_DIAG3 >= “M00” and HC_DIAG3 <= “M99”) OR (HC_DIAG4 >= “M00” and HC_DIAG4 <= “M99”) OR (HC_DIAG5 >= “M00” and HC_DIAG5 <= “M99”) OR (HC_DIAG6 >= “M00” and HC_DIAG6 <= “M99”) THEN

HC_DX_MUSCL_SKELE = 1
ELSE


HC_DX_MUSCL_SKELE = 0

END IF

Genitourinary diseases (%)
IF (HC_DIAG1 >= "N00" and HC_DIAG1 <= "N99") OR (HC_DIAG2 >= "N00" and HC_DIAG2 <= "N99") OR (HC_DIAG3 >= "N00" and HC_DIAG3 <= "N99") OR (HC_DIAG4 >= "N00" and HC_DIAG4 <= "N99") OR (HC_DIAG5 >= "N00" and HC_DIAG5 <= "N99") OR (HC_DIAG6 >= "N00" and HC_DIAG6 <= "N99") THEN
   HC_DX_GEN_URINARY = 1
ELSE
   HC_DX_GEN_URINARY = 0
END IF

Symptoms, signs, abnormal findings (%)
IF (HC_DIAG1 >= "R00" and HC_DIAG1 <= "R99") OR (HC_DIAG2 >= "R00" and HC_DIAG2 <= "R99") OR (HC_DIAG3 >= "R00" and HC_DIAG3 <= "R99") OR (HC_DIAG4 >= "R00" and HC_DIAG4 <= "R99") OR (HC_DIAG5 >= "R00" and HC_DIAG5 <= "R99") OR (HC_DIAG6 >= "R00" and HC_DIAG6 <= "R99") THEN
   HC_DX_INT_ABNORM = 1
ELSE
   HC_DX_INT_ABNORM = 0
END IF

Injury, poisoning, other external causes (%)
IF (HC_DIAG1 >= "S00" and HC_DIAG1 <= "T88") OR (HC_DIAG2 >= "S00" and HC_DIAG2 <= "T88") OR (HC_DIAG3 >= "S00" and HC_DIAG3 <= "T88") OR (HC_DIAG4 >= "S00" and HC_DIAG4 <= "T88") OR (HC_DIAG5 >= "S00" and HC_DIAG5 <= "T88") OR (HC_DIAG6 >= "S00" and HC_DIAG6 <= "T88") THEN
   HC_DX_EXT_INJURY = 1
ELSE
   HC_DX_EXT_INJURY = 0
END IF

External causes of morbidity (%)
IF (HC_DIAG1 >= "V00" and HC_DIAG1 <= "Y99") OR (HC_DIAG2 >= "V00" and HC_DIAG2 <= "Y99") OR (HC_DIAG3 >= "V00" and HC_DIAG3 <= "Y99") OR (HC_DIAG4 >= "V00" and HC_DIAG4 <= "Y99") OR (HC_DIAG5 >= "V00" and HC_DIAG5 <= "Y99") OR (HC_DIAG6 >= "V00" and HC_DIAG6 <= "Y99") THEN
   HC_DX_EXT_MORB = 1
ELSE
   HC_DX_EXT_MORB = 0
END IF

Influences of health status (%)
IF (HC_DIAG1 >= "Z00" and HC_DIAG1 <= "Z99") OR (HC_DIAG2 >= "Z00" and HC_DIAG2 <= "Z99") OR (HC_DIAG3 >= "Z00" and HC_DIAG3 <= "Z99") OR (HC_DIAG4 >= "Z00" and HC_DIAG4 <= "Z99") OR (HC_DIAG5 >= "Z00" and HC_DIAG5 <= "Z99") OR (HC_DIAG6 >= "Z00" and HC_DIAG6 <= "Z99") THEN
   HC_DX_HLTH_FACTORS = 1
ELSE
    HC_DX_HLTH_FACTORS = 0
END IF