RUG-IV Grouper Overview:
Logic Version 1.03 and Code version 1.03.0
July 18, 2013

This is the general documentation for the Final Version of the RUG-IV Grouper Package for Logic Version 1.03 and Code Version 1.03.0. This Final Version based on the SNF PPS Final Rule for FY2014 replaces the Draft Version based on the SNF PPS Proposed Rule that was posted on May 8, 2013.

Changes from Draft Version to Final Version of Version 1.03.0

There are no Draft Version to Final Version changes to the code, lists, and software. The only changes from the Draft Version to the Final Version involve the following documentation changes:

1. In the header on all documentation files, "DRAFT" was changed to "FINAL".

2. In the current overview document, the following minor changes were made:

   a. In the first paragraph of the document, the reference to "FY2013" was changed to "FY2014".

   b. In the Introduction Section (Section 1) on page 3, the different version codes used were clarified.

Changes with Code Version 1.03.0 from Prior Version 1.02.1

The changes with version 1.03.0 are:

1. Add a new value to the rehabilitation classification type parameter (sRehabType). This new value of MCAR3 for FY2014 Medicare classification works the same as the MCAR2 (FY2012 Medicare classification) value but changes the classification requirements for Medium Rehabilitation and Low Rehabilitation as follows:

   a. For Medium Rehabilitation, the requirement of 5 or more therapy days across the three disciplines (sum of O0410A4, O0400B4, and O0400C4) is being replaced by 5 or more distinct calendar days of therapy (O0420).

   b. For Low Rehabilitation, the requirement of 3 or more therapy days across the three disciplines (sum of O0410A4, O0400B4, and O0400C4) is being replaced by 3 or more distinct calendar days of therapy (O0420).

2. As of October 1, 2013, the MDS 3.0 nutrition item K0700A indicating the proportion of calories by artificial route in the last 7 days is being replaced by three new calorie proportion items K0710A1 (received while not a resident), K0710A2 (received while a resident), and K0710A3 (received in the entire 7 days). For assessments with assessment reference date (A2300) on or after 10/1/2013, K0700A is being replaced by K0710A3 in the RUG classification logic.

3. As of October 1, 2013, the MDS 3.0 nutrition item K0700B indicating the average fluid intake by artificial route in the last 7 days is being replaced by three new fluid intake items K0710B1 (received while not a resident), K0710B2 (received while a resident), and K0710B3 (received in the entire 7 days). For assessments with assessment reference date (A2300) on or after 10/1/2013, K0700B is being replaced by K0710B3 in the RUG classification logic.

Version 1.03.0 is backwardly compatible with the prior version 1.02.1 and it is not necessary to use version 1.02.1 for assessments with A2300 before 10/1/2013 and a separate version 1.03.0 for assessments with A2300 on or after 10/1/2013. Version 1.03.0 will handle assessments both before 10/1/2013 and on or after 10/1/2013.

This grouper package is available on the CMS web site under "Nursing Home Quality Initiatives" and then "MDS 3.0 Technical Information". The web address is:

http://www.cms.gov/NursingHomeQualityInits/30_NHQIMDS30TechnicalInformation.asp#TopOfPage

Technical Assistance. If you have questions which are not answered by the grouper files and documentation, please refer to the CMS web site above or the QIES Technical Support Office (QTSO) web site below for further information or for contact information to receive assistance.

http://www.qtso.com/vendor.htm

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Contents

The current document provides general information about this Code Version of the RUG-IV Grouper and contains the following sections:

Section 1. Introduction

This documentation describes the Grouper Package for the RUG-IV system used to classify residents of nursing facilities. This Grouper Package includes user information and source code for both a dynamic-link library (DLL) written in C++ and a SAS module. Access to the DLL has been tested using both C++ programs and Visual Basic programs.

In order to track the versions of the software and documentation, we use three different version codes:

- Logic Version Code: The logic version refers to the version of the classification logic that is implemented in RUG-IV. The current logic version is 1.03.

- Code Version Code: The code version refers to the version of the programming code used to implement the logic version. The current code version is 1.03.0, the first code version for logic version 1.03. If the code is later revised, then the

next code version will be 1.03.1. See the *Code Version History* at the end of this document for changes in RUG-IV logic and code.

- RUG Version Code: The RUG version code consists of the logic version plus the number of groups in the RUG model (48, 57, or 66 groups). For example, the RUG version code is 1.0366 if the 66-group model is used. The RUG version code is submitted on MDS items Z0100B and Z0150B for Medicare classification, on item Z0200B if the state requires submission of a RUG-IV classification in Z0200A, and on item Z0250B if the state requires submission of an alternate RUG-IV classification in Z0250A,

Section 2. Files Available with the Grouper package

Files associated with the RUG-IV Grouper Package are in a ZIP file that contains the following files. Most files contain V1.03 (the current logic version number) or V1.03.0 (the current code version number). In addition, most file names contain a date that is used to distinguish updates pertaining to a particular logic or code version. In the file names listed below, the logic version is designated as "Vn.nn"; the code version as "Vn.nn.n"; and the date as "yyyymmdd".

- General Information Files

  o **RUGIV grouper overview Vn.nn.n yyyymmdd.pdf**

    This is the current document describing general features of the RUG-IV Grouper, including approach, RUG-IV group definitions and order, input and output parameters, input data format, MDS items used, MDS record screening, standard Case Mix Index (CMI) sets, and, standard test data sets.

- RUG-IV Group and MDS 3.0 Item List Files

  o **Group and item lists Vn.nn yyyymmdd.zip** (containing the following csv listing files)

    - **RUGIV group list Vn.nn.csv**

      RUG-IV group list in csv format. The first row gives the column labels.

    - **RUGIV MDS 3.0 item list Vn.nn.csv**

      List of the MDS 3.0 items used for this Logic Version of RUG-IV in csv format. The first row gives the column labels.

- Case Mix Index (CMI) Files (note that updates to the CMI file are keyed to the logic version number rather than the code version number because they may be updated independently of the software).

  o **RUGIV CMI doc Vn.nn yyyymmdd.pdf**

This document defines the RUG-IV Case Mix Index (CMI) sets used for classification.

- o **RUGIV CMI sets Vn.nn yyyymmdd.zip** (contains the following file defining the CMI sets)

  - **RUGIV CMI sets Vn.nn yyyymmdd.csv**

    This is a comma delimited file with the standard CMI sets in a format that will allow ease of coding by developers. The current version of the CMIs contains seven CMI sets. Two CMI sets are for Medicare Part A (66-groups) and are based on national FY2011 Medicare rates – set E01 for rural facilities and E02 for urban facilities. Two other CMI sets are for Medicare Part A (66-groups) and are based on national FY2012 Medicare rates – set E03 for rural facilities and E04 for urban facilities. The other three sets are for state or other use and are based on national nursing time estimates from the STRIVE time study project – F01 for the 47-group model, F02 for the 58-group model, and F03 for the 66-group.

- DLL Files and Documentation

  - o **RUGIV DLL user doc Vn.nn.n yyyymmdd.pdf**

    Document includes user documentation for the DLL, including instructions for calling the DLL from both C++ and Visual Basic. This file also documents the C++ and Visual Basic demo programs.

  - o **RUGIV DLL Vn.nn.n yyyymmdd.zip** (contains the following DLL file and source code files)

    - **RUGIV.dll**

      The actual DLL (dynamic-link library) file for performing RUG-IV Logic Version 1.03 and Code Version 1.03.0 classification.

    - **RUGIV.cpp**

      The C++ module used to perform RUG-IV classification in the DLL (classification logic is here).

    - **RUGIV.h**

      The C++ header file used to create the DLL and used for static linking.

    - **RUGIV.lib**

      A file required if the user wants to use static linking.

- **librug4proc.so**

  A shared object to use to perform RUG-IV classification with UNIX (instead of the DLL).

- **RUGIV.exp**

  An export file from development of the DLL.

- SAS Documentation and Code Files

  o **RUGIV SAS user doc Vn.nn.n yyyymmdd.pdf**

    User documentation for RUG-IV SAS code.

  o **RUGIV SAS Vn.nn.n yyyymmdd zip** (contains the SAS RUG-IV classification module)

    - **RUGIV Vn.nn.n.sas**

      The SAS module for performing RUG-IV classification (classification logic is here).

- Demo Program Files

  Documentation for the C++ Demo Programs and Visual Basic Demo Programs is in the file RUGIV DLL user doc Vn.nn.n yyyymmdd.pdf. Documentation for the SAS Demo files is in the file RUGIV SAS user doc Vn.nn.n yyyymmdd.pdf.

  o C++ Demo Program Files for the DLL

    - **DemoRugIV_cpp1 Vn.nn.n yyyymmdd.zip**

      C++ Demo #1 source code and executable for reading a test data file, calling the DLL, and retrieving output results. Six files are included in the ZIP file. This code illustrates using static linking to a special library (RUGIV.lib) for DLL access.

    - **DemoRugIV_cpp2 Vn.nn.n yyyymmdd.zip**

      C++ Demo #2 source code and executable for reading a test data file, calling the DLL, and retrieving output results. Five files are included in the ZIP file. This code illustrates using LoadLibrary( ) to access the DLL.

  o Visual Basic 6 Demo Program Files for the DLL

    - **DemoRugIV_vb6 Vn.nn.n yyyymmdd.zip**

VB6 Demo source code and executable for reading a test data file, calling the DLL, and retrieving output results. Six files are included in the ZIP file.

o Visual Basic .NET Demo Program Files for the DLL

- **DemoRugIV_net Vn.nn.n yyyymmdd.zip**

  VB .NET Demo source code and executable for reading a test data file, calling the DLL, and retrieving output results. Six files are included in the ZIP file.

o SAS Demo Files

- **DemoRugIV_sas Vn.nn.n yyyymmdd.zip**

  This ZIP file contains one SAS program to read a test data file into a SAS data set, a second SAS program to read that data set and use the SAS RUG-IV classification module ("RUG-IV Vn.nn.n.sas") to produce the classification results in an output SAS data set. Example SAS code to define a CMI set for use in classification ("Demo F03 CMI Set.sas") is also included.

- Test Data File Files

  o **RUGIV grouper test data doc Vn.nn.n yyyymmdd.pdf**

  Documentation for the test data files. Test data files are fixed format text (txt) files using the standard MDS 3.0 fixed format record layout available in the MDS 3.0 data specifications. Only the items needed for RUG-IV are populated in the fixed format records. The records in each test file include known RUG-IV results that can be used for testing.

  o **RUGIV test data files Vn.nn.n yyyymmdd.zip**

  This ZIP file contains the 39 test data test files

Section 3. Features of the RUG-IV Structure and Logic

This RUG-IV Logic Version includes the following features.

- **Hierarchical vs. Index Maximizing Classification.** Classification using any of the three models (48-group, 57-group, or 66-group) can be hierarchical or index maximizing. In hierarchical classification, the resident is assigned to the first group for which he/she qualifies, given the standard hierarchical order of the RUG-IV categories and groups (see Section 4.). In hierarchical classification, if the resident qualifies for the Extensive Services category (e.g. group ES1) and the Clinically Complex category (e.g., group CA1), then classification will be

Extensive Services, since the Extensive Services category is higher than (above) the Clinically Complex category in the standard hierarchical order. In index maximizing classification, qualifications for all groups are examined. All qualified groups are determined, and then the resident is classified in the qualified group with the highest Case Mix Index (CMI). If the resident qualifies both for ES1 and CA1, but CA1 has the higher CMI, then index maximizing classification will be in the CA1 group even though it is lower in the hierarchy.

- **Rehabilitation Classification: Other, FY2011 Special Medicare, FY2012 Special Medicare Classification, or FY2014 Special Medicare Classification.**

  The "Other" Rehabilitation Classification type is based on the number of days and minutes of rehabilitation therapy received in the last 7 days. Total therapy minutes equals all of individual time, plus allocated concurrent time (one-half of concurrent time where rehabilitation therapy is received in a group of 2 residents), plus all of group therapy time (rehabilitation received in a group of 3 or more residents).

  The "FY2011 Special Medicare" Part A Skilled Nursing Facility (SNF) rehabilitation classification type employs two special features:

  1. A limitation is applied to group therapy minutes. Within a therapy discipline (speech therapy, occupational therapy, or physical therapy), the number of group minutes counted is limited to four thirds (4/3) of the sum of individual plus one-half of concurrent minutes. This limits group minutes used for classification to 25% of the total allocated minutes.

  2. For short-stay Medicare Part A stays (8 days or less), where rehabilitation therapy has started but there has been insufficient time to establish a full weekly regimen, the average minutes per day are used for rehabilitation classification, rather than the total minutes over the last 7 days.

  The "FY2012 Special Medicare" Part A SNF rehabilitation classification type employs three special features:

  1. Allocation of group therapy minutes for determining total rehabilitation therapy minutes. Only 1/4 of the group therapy minutes are included in the total rehabilitation therapy minutes.

  2. A limitation is applied to group therapy minutes. Within a therapy discipline (speech therapy, occupational therapy, or physical therapy), the number of allocated group minutes counted is limited to four thirds (4/3) of the sum of individual plus one-half of concurrent minutes. This limits allocated group minutes used for classification to 25% of the total allocated minutes.

  3. For short-stay Medicare Part A stays (8 days or less), where rehabilitation therapy has started but there has been insufficient time to establish a full

weekly regimen, the average minutes per day are used for rehabilitation classification, rather than the total minutes over the last 7 days.

The "FY2014 Special Medicare" Part A SNF rehabilitation classification type employs five special features:

1. Allocation of group therapy minutes for determining total rehabilitation therapy minutes. Only 1/4 of the group therapy minutes are included in the total rehabilitation therapy minutes.

2. A limitation is applied to group therapy minutes. Within a therapy discipline (speech therapy, occupational therapy, or physical therapy), the number of allocated group minutes counted is limited to four thirds (4/3) of the sum of individual plus one-half of concurrent minutes. This limits allocated group minutes used for classification to 25% of the total allocated minutes.

3. For short-stay Medicare Part A stays (8 days or less), where rehabilitation therapy has started but there has been insufficient time to establish a full weekly regimen, the average minutes per day are used for rehabilitation classification, rather than the total minutes over the last 7 days.

4. For Medium Rehabilitation, the requirement of 5 or more therapy days across the three disciplines (sum of O0410A4, O0400B4, and O0400C4) is being replaced by 5 or more distinct calendar days of therapy (O0420).

5. For Low Rehabilitation, the requirement of 3 or more therapy days across the three disciplines (sum of O0410A4, O0400B4, and O0400C4) is being replaced by 3 or more distinct calendar days of therapy (O0420).

- **66-Group Model.** The 66-group model was developed by CMS to be used in Medicare SNF payment system beginning 10/01/2010. This model includes 8 clinical categories. The category precedence for hierarchical classification is the Rehabilitation and Extensive Services category (9 groups), the Rehabilitation category (14 groups), the Extensive Services category (3 groups), the Special Care High category (8 groups), the Special Care Low category (8 groups), the Clinically Complex category (10 groups), the Behavioral Symptoms and Cognitive Performance category (4 groups), and the Reduced Physical Functions category (10 groups).

- **57-Group Model.** The 57-group model is a simplified model intended for use in state Medicaid payment systems. This model is the same as the 66-group model except that the Rehabilitation and Extensive Services groups have been removed. For the 57-group model, the category precedence for hierarchical classification is the Rehabilitation category (14 groups), the Extensive Services category (3 groups), the Special Care High category (8 groups), the Special Care Low category (8 groups), the Clinically Complex category (10 groups), the Behavioral Symptoms and Cognitive Performance category (4 groups), and the Reduced Physical Functions category (10 groups).

- **48-Group Model.** The 48-group model is a further simplification of the 57-group model and is intended for use in state Medicaid payment systems. In the 48-group model, the 14 Rehabilitation category groups are reduced to 5 groups. Also, the Rehabilitation category is moved below the Extensive Services category in the hierarchy. For the 48-group model, the category precedence for hierarchical classification is the Extensive Services category (3 groups), the Rehabilitation category (only 5 groups), the Special Care High category (8 groups), the Special Care Low category (8 groups), the Clinically Complex category (10 groups), the Behavioral Symptoms and Cognitive Performance category (4 groups), and the Reduced Physical Functions category (10 groups).

- **Normal versus Non-Therapy Classification.** In "Normal" classification, the resident can be classified into a Rehabilitation and Extensive Services group, a Rehabilitation group, or any other group. In "Non-Therapy" classification, classification into the Rehabilitation and Extensive Services groups and the Rehabilitation groups is not allowed. In non-therapy classification, a resident, who would normally classify into a Rehabilitation and Extensive Services group or a Rehabilitation group, will be classified into another group for which they classify.

Section 4. Approach Used in the Current Code Version

This RUG-IV Code Version simultaneously produces the following 4 different classification results for an MDS 3.0 assessment record:

1. Hierarchical normal classification. This hierarchical result can include a Rehabilitation and Extensive Services group or a Rehabilitation group.

2. Hierarchical Non-Therapy classification. This hierarchical result excludes the Rehabilitation and Extensive Services groups and the Rehabilitation groups.

3. Index-maximized normal classification. This index-maximized result can include a Rehabilitation and Extensive Services group or a Rehabilitation group.

4. Index-maximized Non-Therapy classification. This index-maximized result excludes the Rehabilitation and Extensive Services groups and the Rehabilitation groups.

The code will produce these 4 results for a selected model (66-group, 57-group, or 48-group). The model employed is determined by an input parameter (sModel) to the code.

The code will produce these 4 results for a selected rehabilitation classification method (Other, FY2011 Special Medicare, FY2012 Special Medicare, or FY2014 Special Medicare). The rehabilitation method employed is determined by an input parameter (sRehabType) to the code.

Section 5. RUG-IV Groups in Standard Order

Table 5-1 presents the RUG-IV groups in standard hierarchical order. All groups from all three models (48-group, 57-group, and 66-group) are included in the listing in Table 5-1. For any specific model, some of the groups will be inactive. For example, the Rehabilitation and Extensive Services groups (groups 1-9) are only active in the 66-group model. One additional group (AAA) has been added at the bottom as group 72. AAA is the default group assigned when there is no MDS assessment or the RUG-IV classification is invalid.

The group order in Table 5-1 is also the array element order for the CMI array required for RUG-IV index maximized classification with the grouper (see Section 10 for the CMI array values for the standard CMI sets).

Table 5-1. RUG-IV Groups in Standard Order

Group Number and CMI Array Element	RUG-IV Group
	Rehabilitation/Extensive Groups for 66-group model
1	RUX: Rehabilitation Ultra High And Extensive / ADL 11 - 16
2	RUL: Rehabilitation Ultra High And Extensive / ADL 2 - 10
3	RVX: Rehabilitation Very High And Extensive / ADL 11 - 16
4	RVL: Rehabilitation Very High And Extensive / ADL 2 - 10
5	RHX: Rehabilitation High And Extensive / ADL 11 - 16
6	RHL: Rehabilitation High And Extensive / ADL 2 - 10
7	RMX: Rehabilitation Medium And Extensive / 11 - 16
8	RML: Rehabilitation Medium And Extensive / ADL 2 - 10
9	RLX: Rehabilitation Low And Extensive / ADL 2 - 16
	Rehabilitation Groups for the 66-group and 57-group models
10	RUC: Rehabilitation Ultra High / ADL 11 – 16
11	RUB: Rehabilitation Ultra High / ADL 6 – 10
12	RUA: Rehabilitation Ultra High / ADL 0 – 5
13	RVC: Rehabilitation Very High / ADL 11 – 16
14	RVB: Rehabilitation Very High / ADL 6 – 10
15	RVA: Rehabilitation Very High / ADL 0 – 5
16	RHC: Rehabilitation High / ADL 11 – 16
17	RHB: Rehabilitation High / ADL 6 – 10
18	RHA: Rehabilitation High / ADL 0 – 5
19	RMC: Rehabilitation Medium / ADL 11 – 16

Group Number and CMI Array Element	RUG-IV Group
20	RMB: Rehabilitation Medium / ADL 6 – 10
21	RMA: Rehabilitation Medium / ADL 0 – 5
22	RLB: Rehabilitation Low / ADL 1 – 16
23	RLA: Rehabilitation Low / ADL 0 – 10
	Extensive Groups for all models (66-, 57-, and 48-groups)
24	ES3: Extensive Services Level 3 / ADL >= 2
25	ES2: Extensive Services Level 2 / ADL >= 2
26	ES1: Extensive Services Level 1 / ADL >= 2
	Rehabilitation Groups for the 48-group model
27	RAE: Rehabilitation All Levels / ADL 15 – 16
28	RAD: Rehabilitation All Levels / ADL 11 – 14
29	RAC: Rehabilitation All Levels / ADL 6 – 10
30	RAB: Rehabilitation All Levels / ADL 2 – 5
31	RAA: Rehabilitation All Levels / ADL 0 – 1
	Remaining Groups for all models (66-, 57-, and 48-groups)
32	HE2: Special Care High with Depression / ADL 15 – 16
33	HE1: Special Care High with No Depression / ADL 15 – 16
34	HD2: Special Care High with Depression / ADL 11 – 14
35	HD1: Special Care High with No Depression / ADL 11 – 14
36	HC2: Special Care High with Depression / ADL 6 – 10
37	HC1: Special Care High with No Depression / ADL 6 – 10
38	HB2: Special Care High with Depression / ADL 2 – 5
39	HB1: Special Care High with No Depression / ADL 2 – 5
40	LE2: Special Care Low with Depression / ADL 15 – 16
41	LE1: Special Care Low with No Depression / ADL 15 – 16
42	LD2: Special Care Low with Depression / ADL 11 – 14
43	LD1: Special Care Low with No Depression / ADL 11 – 14
44	LC2: Special Care Low with Depression / ADL 6 – 10
45	LC1: Special Care Low with No Depression / ADL 6 – 10
46	LB2: Special Care Low with Depression / ADL 2 – 5
47	LB1: Special Care Low with No Depression / ADL 2 – 5
48	CE2: Clinically Complex with Depression / ADL 15 – 16
49	CE1: Clinically Complex with No Depression / ADL 15 – 16
50	CD2: Clinically Complex with Depression / ADL 11 – 14
51	CD1: Clinically Complex with No Depression / ADL 11 – 14

Group Number and CMI Array Element	RUG-IV Group
52	CC2: Clinically Complex with Depression / ADL 6 – 10
53	CC1: Clinically Complex with No Depression / ADL 6 – 10
54	CB2: Clinically Complex with Depression / ADL 2 – 5
55	CB1: Clinically Complex with No Depression / ADL 2 – 5
56	CA2: Clinically Complex with Depression / ADL 0 – 1
57	CA1: Clinically Complex with No Depression / ADL 0 – 1
58	BB2: Behavior/Cognitive with Rest.[1] Nursing / ADL 2 – 5
59	BB1: Behavior/Cognitive with No Rest.[1] Nursing / ADL 2 - 5
60	BA2: Behavior/Cognitive with Rest.[1] Nursing / ADL 0 - 1
61	BA1: Behavior/Cognitive with No Rest.[1] Nursing / ADL 0 – 1
62	PE2: Physical Function with Rest.[1] Nursing / ADL 15 – 16
63	PE1: Physical Function with No Rest.[1] Nursing / ADL 15 – 16
64	PD2: Physical Function with Rest.[1] Nursing / ADL 11 – 14
65	PD1: Physical Function with No Rest.[1] Nursing / ADL 11 – 14
66	PC2: Physical Function with Rest.[1] Nursing / ADL 6 – 10
67	PC1: Physical Function with No Rest.[1] Nursing / ADL 6 – 10
68	PB2: Physical Function with Rest.[1] Nursing / ADL 2 – 5
69	PB1: Physical Function with No Rest.[1] Nursing / ADL 2 – 5
70	PA2: Physical Function with Rest.[1] Nursing / ADL 0 – 1
71	PA1: Physical Function with No Rest.[1] Nursing / ADL 0 – 1
72	AAA: Default

Section 6. MDS Assessment Input Data

This Code Version of the RUG-IV grouper requires that MDS 3.0 assessment data be provided in a string corresponding to the standard fixed format layout. This fixed format layout is documented in the MDS 3.0 data submission specifications that are available on the CMS web site on the "MDS 3.0 Technical Information" page:

> http://www.cms.hhs.gov/NursingHomeQualityInits/30_NHQIMDS30TechnicalInformation.asp#TopOfPage

The order of the MDS 3.0 items and their positions in the fixed format layout can be found in the item master (itm_mstr) table that is provided along with the data submission specifications. This table can be found in the Access database that is provided or in a comma-delimited (CSV) file called itm_mstr.

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[1] Restorative

Section 7. Grouper Input and Output Parameters

There are a number of input and output parameters used by this Code Version of the grouper. Before calling the grouper, you must "set" the input parameters to appropriate values for the type of RUG-IV classification desired. You should also set the output string parameters to blank strings and the output numeric parameters to appropriate 0 (zero) or 0.0 values before calling the grouper. The grouper will return the output parameter values for the RUG-IV classification made.

Note*:* Several users have been confused about receiving a default AAA classification for a Start of Therapy (SOT) OMRA. An SOT OMRA is not allowed to have a normal Medicare classification (Item Z0100A) that is a non-therapy group (group does not start with "R"). When an SOT OMRA produces a normal Medicare classification of a non-therapy group, the grouper resets the classification to the AAA default group and issues an error code (iError) of 5. The record will be rejected by the QIES ASAP system if submitted. Classification is only valid if iError equals 0 and software should always check the grouper error code.

The input and output parameters are slightly different for the C++ DLL and for the SAS module. These parameters are fully documented in the DLL and SAS documentation that is provided in the grouper package.

Section 8. MDS Record Screening

The RUG-IV grouper will produce a RUG-IV classification for any OBRA assessment (MDS 3.0 Item A0310A = 01 through 06) or for any PPS assessment (Item A0310B = 01 through 07). The grouper will not produce a RUG-IV classification for an entry record (Item A0301F = 01), a death in facility record (Item A0310F = 12), or a discharge assessment record that is not combined with an OBRA or PPS assessment (Item A0310F = 10 or 11 and A0310A = 99 and A0310B = 99), or an inactivation record (Item X0100 = 3). For these latter types of records, the grouper will return an error code (output parameter iError) of 3.

Section 9. MDS Items Used in RUG-IV

Table 9-1 lists the 117 MDS 3.0 items used for RUG-IV classification. The table provides the length of each item and the item's start and end positions in the standard MDS 3.0 fixed format record. Four new MDS items (K0510A1, K0510A2, K0510B1, and K0510B2) has been added with this Logic Version.

Table 9-1. MDS 3.0 Items Used in RUG-IV

RUG Item #	MDS Label	Description	Length	Start Position	End Position
1	A0310A	Type of assessment: OBRA	2	270	271
2	A0310B	Type of assessment: PPS	2	272	273
3	A0310C	Type of assessment: OMRA	1	274	274
4	A0310D	Swing bed clinical change assessment	1	275	275
5	A2300	Assessment reference date	8	486	493
6	A2400B	Start date of most recent Medicare stay	8	495	502
7	A2400C	End date of most recent Medicare stay	8	503	510
8	B0100	Comatose	1	511	511
9	B0700	Makes self understood	1	515	515
10	C0500	BIMS res interview: summary score	2	527	528
11	C0700	Staff asmt mental status: short-term memory OK	1	530	530
12	C1000	Cognitive skills for daily decision making	1	537	537
13	D0300	PHQ res: total mood severity score	2	562	563
14	D0600	PHQ staff: total mood score	2	585	586
15	E0100A	Psychosis: hallucinations	1	588	588
16	E0100B	Psychosis: delusions	1	589	589
17	E0200A	Physical behav symptoms directed toward others	1	591	591
18	E0200B	Verbal behav symptoms directed toward others	1	592	592
19	E0200C	Other behav symptoms not directed toward others	1	593	593
20	E0800	Rejection of care: presence and frequency	1	601	601
21	E0900	Wandering: presence and frequency	1	602	602
22	G0110A1	Bed mobility: self-performance	1	646	646
23	G0110A2	Bed mobility: support provided	1	647	647
24	G0110B1	Transfer: self-performance	1	648	648
25	G0110B2	Transfer: support provided	1	649	649
26	G0110H1	Eating: self-performance	1	660	660
27	G0110H2	Eating: support provided	1	661	661
28	G0110I1	Toilet use: self-performance	1	662	662
29	G0110I2	Toilet use: support provided	1	663	663
30	H0200C	Urinary toileting program: current program/trial	1	689	689
31	H0500	Bowel toileting program being used	1	692	692

RUG Item #	MDS Label	Description	Length	Start Position	End Position
32	I2000	Pneumonia	1	711	711
33	I2100	Septicemia	1	712	712
34	I2900	Diabetes mellitus (DM)	1	717	717
35	I4400	Cerebral palsy	1	728	728
36	I4900	Hemiplegia or hemiparesis	1	731	731
37	I5100	Quadriplegia	1	733	733
38	I5200	Multiple sclerosis	1	734	734
39	I5300	Parkinson's disease	1	736	736
40	I6200	Asthma (COPD) or chronic lung disease	1	747	747
41	I6300	Respiratory failure	1	748	748
42	J1100C	Short breath/trouble breathing: lying flat	1	851	851
43	J1550A	Problem conditions: fever	1	855	855
44	J1550B	Problem conditions: vomiting	1	856	856
45	K0300	Weight loss	1	877	877
46	K0500A	Nutritional approaches: parenteral /IV feeding	1	878	878
47	K0500B	Nutritional approaches: feeding tube	1	879	879
48	K0510A1	Nutrition approach: Not Res: parenteral/IV feeding	1	1444	1444
49	K0510A2	Nutrition approach: Res: parenteral/IV feeding	1	1445	1445
50	K0510B1	Nutrition approach: Not Res: feeding tube	1	1446	1446
51	K0510B2	Nutrition approach: Res: feeding tube	1	1447	1447
52	K0700A	Proportion total calories via parenteral/tube feed	1	883	883
53	K0700B	Average fluid intake per day by IV or tube	1	884	884
54	K0710A3	Prop calories parenteral/tube feed: 7 days	1	1468	1468
55	K0710B3	Avg fluid intake per day IV/tube: 7 days	1	1471	1471
56	M0300B1	Stage 2 pressure ulcers: number present	1	900	900
57	M0300C1	Stage 3 pressure ulcers: number present	1	910	910
58	M0300D1	Stage 4 pressure ulcers: number present	1	912	912
59	M0300F1	Unstaged slough/eschar: number present	1	916	916
60	M1030	Number of venous and arterial ulcers	1	940	940
61	M1040A	Other skin probs: infection of the foot	1	941	941
62	M1040B	Other skin probs: diabetic foot ulcer(s)	1	942	942
63	M1040C	Other skin probs: other open lesion(s) on the foot	1	943	943

RUG Item #	MDS Label	Description	Length	Start Position	End Position
64	M1040D	Other skin probs: lesions not ulcers, rashes, cuts	1	944	944
65	M1040E	Other skin probs: surgical wound(s)	1	945	945
66	M1040F	Other skin probs: burns (second or third degree)	1	946	946
67	M1200A	Skin/ulcer treat: pressure reduce device for chair	1	948	948
68	M1200B	Skin/ulcer treat: pressure reducing device for bed	1	949	949
69	M1200C	Skin/ulcer treat: turning/repositioning	1	950	950
70	M1200D	Skin/ulcer treat: nutrition/hydration	1	951	951
71	M1200E	Skin/ulcer treat: ulcer care	1	952	952
72	M1200F	Skin/ulcer treat: surgical wound care	1	953	953
73	M1200G	Skin/ulcer treat: application of dressings	1	954	954
74	M1200H	Skin/ulcer treat: apply ointments/medications	1	955	955
75	M1200I	Skin/ulcer treat: apply dressings to feet	1	956	956
76	N0350A	Insulin: insulin injections	1	959	959
77	N0350B	Insulin: orders for insulin	1	960	960
78	O0100A2	Treatment: chemotherapy - while resident	1	970	970
79	O0100B2	Treatment: radiation - while resident	1	972	972
80	O0100C2	Treatment: oxygen therapy - while resident	1	974	974
81	O0100E2	Treatment: tracheostomy care - while resident	1	978	978
82	O0100F2	Treatment: vent/respirator - while resident	1	980	980
83	O0100H2	Treatment: IV medications - while resident	1	984	984
84	O0100I2	Treatment: transfusions - while resident	1	986	986
85	O0100J2	Treatment: dialysis - while resident	1	988	988
86	O0100M2	Treatment: isolate/quarantine - while resident	1	993	993
87	O0400A1	Speech-language/audiology: individ minutes	4	1008	1011
88	O0400A2	Speech-language/audiology: concur minutes	4	1012	1015
89	O0400A3	Speech-language/audiology: group minutes	4	1016	1019
90	O0400A4	Speech-language/audiology: number of days	1	1020	1020
91	O0400A5	Speech-language/audiology: start date	8	1021	1028
92	O0400A6	Speech-language/audiology: end date	8	1029	1036
93	O0400B1	Occupational therapy: individ minutes	4	1037	1040
94	O0400B2	Occupational therapy: concur minutes	4	1041	1044

RUG Item #	MDS Label	Description	Length	Start Position	End Position
95	O0400B3	Occupational therapy: group minutes	4	1045	1048
96	O0400B4	Occupational therapy: number of days	1	1049	1049
97	O0400B5	Occupational therapy: start date	8	1050	1057
98	O0400B6	Occupational therapy: end date	8	1058	1065
99	O0400C1	Physical therapy: individ minutes	4	1066	1069
100	O0400C2	Physical therapy: concur minutes	4	1070	1073
101	O0400C3	Physical therapy: group minutes	4	1074	1077
102	O0400C4	Physical therapy: number of days	1	1078	1078
103	O0400C5	Physical therapy: start date	8	1079	1086
104	O0400C6	Physical therapy: end date	8	1087	1094
105	O0400D2	Respiratory therapy: number of days	1	1099	1099
106	O0420	Distinct calendar days of therapy	1	1484	1484
107	O0450A	Resumption of therapy code	1	1429	1429
108	O0500A	Range of motion (passive): number of days	1	1110	1110
109	O0500B	Range of motion (active): number of days	1	1111	1111
110	O0500C	Splint or brace assistance: number of days	1	1112	1112
111	O0500D	Bed mobility training: number of days	1	1113	1113
112	O0500E	Transfer training: number of days	1	1114	1114
113	O0500F	Walking training: number of days	1	1115	1115
114	O0500G	Dressing and/or grooming training: number of days	1	1116	1116
115	O0500H	Eating and/or swallowing training: number of days	1	1117	1117
116	O0500I	Amputation/prosthesis training: number of days	1	1118	1118
117	O0500J	Communication training: number of days	1	1119	1119

Section 10. Standard Case Mix Index (CMI) Sets

Seven standard CMIs sets will be available for index maximizing classification with this Logic Version of the RUG-IV Grouper. The CMI values for the CMI sets are provided in separate documents that are described above (see *Section 2: Files Available with the Grouper package*).

The seven CMI sets and their standard usage are as follows:

- **Set E01.** This is the SNF PPS set in use for **rural** facilities in the Medicare Part A program for FY2011. Set E01 is appropriate to the 66-group model and is based upon the national average rural total payment rates (in descending order) for FY 2011. This set is used for Medicare Part A residents in rural facilities to index maximize to insure that the payment for the resident is at the highest appropriate rate.

- **Set E02.** This is the SNF PPS set in use for **urban** facilities in the Medicare Part A program for FY2011. Set E02 is appropriate to the 66-group model and is based upon the national average urban total payment rates (in descending order) for FY 2011. This set is used for Medicare Part A residents in urban facilities to index maximize to insure that the payment for the resident is at the highest appropriate rate.

- **Set E03.** This is the SNF PPS set in use for **rural** facilities in the Medicare Part A program for FY2012. Set E03 is appropriate to the 66-group model and is based upon the national average rural total payment rates (in descending order) for FY 2012. This set is used for Medicare Part A residents in rural facilities to index maximize to insure that the payment for the resident is at the highest appropriate rate.

- **Set E04.** This is the SNF PPS set in use for **urban** facilities in the Medicare Part A program for FY2012. Set E04 is appropriate to the 66-group model and is based upon the national average urban total payment rates (in descending order) for FY 2012. This set is used for Medicare Part A residents in urban facilities to index maximize to insure that the payment for the resident is at the highest appropriate rate.

- **Set F01.** This is a set for the 48-group model based on national estimates of nursing staff time from the STRIVE staff time study. States using RUG-IV for Medicaid payment can opt to use this set for 48-group index maximized classification based on nursing time only.

- **Set F02.** This is a set for the 57-group model based on national estimates of nursing staff time from the STRIVE staff time study. States using RUG-IV for Medicaid payment can opt to use this set for 57-group index maximized classification based on nursing time only.

- **Set F03.** This is a set for the 66-group model based on national estimates of nursing staff time from the STRIVE staff time study. States using RUG-IV for Medicaid payment can opt to use this set for 66-group index maximized classification based on nursing time only.

Section 11. Using the DLL

The dynamic-link library (DLL) provided with this version of RUG-IV Code is named RUGIV.DLL and this DLL performs all standard RUG-IV classifications for that version. A separate document described above provides instructions for calling the DLL from C++, Visual Basic 6, and Visual Basic .NET (see *Section 2: Files Available with the Grouper package*).

Section 12. Using the SAS Code

A standard SAS code module provided with this version of the RUG-IV Code is named "RUGIV V1.03.0.sas" and this SAS code performs all standard RUG-IV classifications for that version. A separate document described above provides instructions for using the standard SAS code module (see *Section 2: Files Available with the Grouper package*).

Section 13. Standard Test Data Files

A set of 39 test data files is provided with this Code Version of the RUG-IV grouper. The test files have a "txt" extension and are in the MDS 3.0 standard fixed format record layout provided in the MDS 3.0 data specifications.

For software developed to incorporate the standard DLL, it is sufficient to use the following 9 test data files for testing:

- Gp48_Reh_Other_Test_v3.txt – which tests 48 group classification.
- Gp57_Reh_Other_Test_v3.txt – which tests 57 group classification.
- Gp66_Reh_Other_Test_v3.txt – which tests 66 group classification.
- Mcare_rehab_Test_v4.txt – which tests special Medicare rehabilitation classification.
- Gp66_index_max_Test_v3.txt – which tests index maximizing classification.
- K0500_chg_Test_v1.txt – which tests the K0500 versus K0510 items.
- K0700_chg_Test_v1.txt – which tests the K0700 versus K0710 items.
- O0420_MCAR2_Test_v2.txt – which tests the Medicare FY2012 classification with parameter sRehabType = 'MCAR2'.
- O0420_MCAR3_Test_v2.txt – which tests the Medicare FY2014 classification with parameter sRehabType = 'MCAR3'.

If you are developing your own RUG-IV classification code, then all 39 test files should be used to ensure accuracy. Please refer to the documentation that accompanies the test data file for details.

Section 14. Code Version History

RUG-IV Logic Version 1.00

- **Code Version 1.00**

  October 2009 – **Public Version**

  This version was limited to SAS classification code, documentation, and test data. The code did not include all features.

- **Code Version 1.01**

  November 2009 – Internal Version Only (not public)

- **Code Version 1.02**

  November 2009 – Internal Version Only (not public)

- **Code Version 1.03**

  December 2009 – Internal Version Only (not public)

- **Code Version 1.00.4**

  February 2010 – **Public Version**

  This is the initial full version of the RUG-IV grouper. Version includes:

  - Full documentation.

  - C++ and SAS classification code.

  - Demo programs for C++, Basic, and SAS.

  - DLL.

  - Extensive test data.

  Code changes from prior public version (1.00):

  - Allow input parameters to be upper, lower, or mixed case.

  - Added validation of input parameters and assignment of an error code.

  - Rearranged placement of initialization of results variables.

  - Added code to set RUG-IV group to AAA (default group) if a non-therapy RUG-IV classification occurs for a Start of Therapy OMRA assessment.

  - Added code to calculate the HIPPS Assessment Indicator (AI) code.

- Added K0500A as qualifier for Special Care High (this condition was inadvertently omitted in previous versions)

- **Code Version 1.00.5**

  May 2010 – **Public Version**

  Changes with this version were:

  - Added CMI sets F01 and F02.

  - Correct use of MDS item K0300 (weight loss).

  - Corrected the calculation of the iError = 5 output parameter value.

  - Included the correct executable and source code files for the C++ Demo programs.

- **Code Version 1.00.6**

  July 2010 – **Public Version**

  Changes with this version were:

  - Made three corrections to the code for determination of cognitive impairment.

  - Added a new check for an input parameter error. Added code to set iError = 4 condition if any CMI value input in the nCmiArray array is > 9999.

- **Code Version 1.00.7**

  August 2010 – Internal Version Only (not public)

  Changes with this version were:

  - Corrected C++ code and DLL with regard to date comparisons in identifying a Medicare Care Short Stay assessment.

  - Changed the multiplier for the Medicare group therapy time adjustment from 1.33 to 4.0/3.0.

  - Added E01 and E02 Case Mix Index (CMI) sets and corrected the F02 CMI set.

- **Code Version 1.00.8**

  August 2010 – **Public Version**

  Changes with this version were:

- Changed code to not reset the non-therapy classification to the AAA default group.

- **Code Version 1.00.9**

  October 2010 – **Public Version**

  Changes with this version were:

  - Changed code for an SOT OMRA to require a classification result in a group involving rehabilitation (Rehabilitation Plus Extensive group or Rehabilitation group) for Medicare classification but not non-Medicare classification.

  - Changed code for an SOT OMRA not combined with an OBRA assessment (excluding a discharge assessment) or another PPS assessment to reset all RUG group results to the default AAA group.

- **Code Version 1.01.1**

  October 2011 – **Public Version**

  Changes with this version were:

  - Add a new value for the rehabilitation classification type parameter (sRehabType). This new value of "MCAR2" for FY2012 works the same as the "MCARE" value for FY2011 but adds allocation of group therapy time for rehabilitation classification.

  - Add new Assessment Indicator (AI) codes for assessments involving resumption and change in rehabilitation therapy. New MDS 3.0 item O0450A Resumption of Therapy Code is used.

  - Fix a very rare rounding error that occurred in the calculation of total rehabilitation minutes on some platforms.

  - Correct the Medicare Short Stay Assessment indicator code. In previous versions, the Short Stay indicator could be set if the assessment was a Start of Therapy OMRA whether or not combined with an End of Therapy OMRA. The code has been corrected to set the Short Stay indicator only if the assessment is a Start of Therapy OMRA NOT combined with an End of Therapy OMRA.

  - Change the code for C0500 (BIMS summary score), D0300 (PHQ resident interview summary score), and D0600 (PHQ staff assessment summary score) to insure proper handling of numeric values that either are right-justified with leading-zero fill or are left-justified.

- Change the Medicare 25% group therapy limitation code to avoid SAS warning messages when any therapy minutes items have dash ('-') values.

- When a Start of Therapy OMRA produces a non-therapy classification, then reset the resulting CMI value to the value for the default group, since classification in a non-therapy group is invalid.

- **Code Version 1.02.0**

  April 2012 – **Public Version**

  Changes with this version of the RUG-IV classification logic were:

  - For assessments with assessment reference date (A2300) before 4/1/2012, enteral/parentral feeding is indicated by K0500A being checked. For these assessments, tube feeding is indicated by K0500A being checked.

  - For assessments with assessment reference date (A2300) on or after 4/1/2012, enteral/parentral feeding is indicated by either K0510A1 or K0510A2 being checked. For these assessments, tube feeding is indicated by either K0510B1 or K0510B2 being checked.

- **Code Version 1.02.1**

  April 2012 – **Public Version**

  Corrected a coding error in Code Version 1.02.0 that resulted in inappropriate rejection of a few Start of Therapy Assessments.

- **Code Version 1.03.0**

  October 2013 – **Public Version**

  Changes with this version of the RUG-IV classification logic were:

  - For assessments with assessment reference date (A2300) before 10/1/2013, K0700A indicates calories received by artificial means, while on or after 10/1/2013, K0710A3 is the indicator.

  - For assessments with assessment reference date (A2300) before 10/1/2013, K0700B indicates average fluid intake by artificial means, while on or after 10/1/2013, K0710B3 is the indicator.

  - For assessments with assessment reference date (A2300) before 10/1/2013, Medicare classification into the Medium and Low Rehabilitation groups is based on the total days of rehabilitation (O0410A4, O0400B4, and O0400C4), while on or after 10/1/2013, this is based on distinct calendar days of therapy (O0420).