

User Documentation for the RUG-IV SAS Code: Logic Version 1.00 Code Version 1.00.8

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This is user documentation for the SAS code provided in the RUG-IV Logic Version 1.00 Code Version 1.00.8 Grouper package.

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Introduction

The RUG-IV classification SAS code provided with the Code Version 1.00.8 of the grouper package is named ***RUGIV V1.00.8.sas*** and performs exactly the same RUG-IV classification as the Code Version 1.08 DLL (***RUGIV.dll***). Execution of the classification SAS code calculates (1) a normal hierarchical RUG-IV classification, (2) a non-therapy hierarchical RUG-IV classification, (3) a normal index maximized classification, and (4) a non-therapy index maximized classification. Several intermediate classification results are also returned. The input and output parameters, including the intermediate results, are described in detail in Table 1 below. Depending on the input parameters set, the SAS code will produce results for the RUG-IV 48-group, 57-group, or 66-group model using either the "Other" or "Special Medicare" type of rehabilitation classification.

Input and Output Parameters

Table 1 describes the input and output parameters for the SAS classification code. These are the same parameters as used by the DLL with the exception of the first parameter. The standard MDS 3.0 fixed format record is not used in the SAS code. Instead all 109 MDS 3.0 RUG-IV items with variable names corresponding to the standard MDS 3.0 item labels (see Section 9 of ***RUGIV grouper overview V1.00.8 yyyyymmdd.doc***) (where "yyyyymmdd" stands for the date of publication) must be

available in a SAS input data set read when the RUG-IV SAS code is executed. Description of a SAS Demo program to create an appropriate SAS input data set from a standard fixed format test file is provided at the end of this document. Description of a second SAS Demo program to (1) set the required input parameters, (2) perform RUG-IV classification with the **RUGIV V1.00.8.sas** module, and (3) create an output SAS data set with the calculated results is also provided at the end of this document.

Table 1. Standard Input and Output Parameters for the SAS Classification Code

Parameter Name	Parameter Type	Data Type	Description
SAS input data set	Input	SAS data set	A SAS data set containing all 109 MDS 3.0 RUG-IV items with variable names corresponding to the standard MDS 3.0 item labels.
sRehabType	Input	Character	<p>A string containing one of the following two values designating the type of rehab classification to perform:</p> <ul style="list-style-type: none"> • “OTHER” = rehabilitation classification (1) does not use the Medicare 25% limitation on group rehab therapy time and (2) only uses total rehab therapy minutes across days for classification • “MCARE” = special Medicare rehabilitation classification (1) using the 25% limitation on group rehab therapy time and (2) allowing alternative Medicare Short Stay rehabilitation classification based on average therapy minutes per day instead of classification based on total minutes across days <p>Upper, lower, or mixed case is acceptable when supplying this parameter.</p>
sModel	Input	Character	<p>A string containing one of the following three values designating the RUG-IV model to use:</p> <ul style="list-style-type: none"> • “66” = 66-group model • “57” = 57-group model • “48” = 48-group model

Table 1. Standard Input and Output Parameters for the SAS Classification Code

Parameter Name	Parameter Type	Data Type	Description
nCmiArray	Input	Numeric	<p>nCmiArray is a double-precision array containing case mix indices (CMIs). This array affects the index maximized RUG-IV classification returned by the grouper. The array must be supplied even if you are not interested in the index maximized RUG-IV classification. If you are not interested in index maximized results, you can initialize the array with zeroes and the index maximized RUG-IV classification will equal the hierarchical RUG-IV classification.</p> <p>For C++ and Visual Basic programs calling the grouper DLL, the array must be dimensioned from 0 to 72. Put the 72 CMI indices in elements 1 to 72 (element 0 can be initialized to 0.0). For SAS programs using the SAS grouper module, the array should be dimensioned with 72 elements and there is no "0" element.</p> <p>The RUG-IV groups corresponding to the 72 elements in nCmiArray (see Table 2) and the standard CMI sets listed in the grouper overview documentation ("RUGIV CMI doc V1.00 yyyyymmdd.doc", where "yyyyymmdd" stands for the publication date).</p>
l_Mcare_short_stay	Output	Numeric	<p>The grouper will return a Medicare Short Stay indicator value of 1 if the assessment is a start of therapy OMRA assessment performed at the end of a Medicare short stay and the rehabilitation classification type is special Medicare. Such an assessment allows alternative Medicare Short Stay rehabilitation classification based on average therapy minutes per day rather than classification based on total minutes across days. This indicator is recorded on the MDS at item Z0100C.</p> <p>This indicator has the following values:</p> <p style="padding-left: 40px;">0 = not Medicare Short Stay assessment 1 = Medicare Short Stay assessment</p>
sAI_code	Output	Charcater	Medicare assessment indicator (AI) code. This code is recorded as the 4 th and 5th characters of MDS items Z0100A and Z0150A.
i_adl_tot	Output	Numeric	Total RUG-IV ADL score (value 0 – 16)
l_depression	Output	Numeric	Depression indicator (0 = no; 1 = yes)
i_rNursing_cnt	Output	Numeric	Count of restorative nursing services (each received 6 days or more)
i_ext_serv_level	Output	Numeric	Level of extensive services (0 to 3)
l_sp_high_cond	Output	Numeric	Special care high condition present (0 = no; 1 = yes)

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Parameter Name	Parameter Type	Data Type	Description
l_sp_low_cond	Output	Numeric	Special care low condition present (0 = no; 1 = yes)
l_cog_impair	Output	Numeric	Cognitive impairment indicator (0 = no; 1 = yes)
l_beh_sympt	Output	Numeric	Behavior symptoms indicator (0 = no; 1 = yes)
l_ext_serv	Output	Numeric	Extensive services category indicator (0 = no; 1 = yes)
n_tot_rehab_min	Output	Numeric	Total rehabilitation therapy minutes
i_tot_rehab_days	Output	Numeric	Total rehabilitation days
i_rehab_type_5days	Output	Numeric	Number of therapy disciplines with 5 days
i_rehab_type_3days	Output	Numeric	Number of therapy disciplines with 3 days
n_avg_rehab_min	Output	Numeric	Average rehabilitation minutes per day for a Medicare Short Stay
l_rehab_ultra	Output	Numeric	Ultra high rehab category indicator (0 = no; 1 = yes)
l_rehab_very	Output	Numeric	Very high rehab category indicator (0 = no; 1 = yes)
l_rehab_high	Output	Numeric	High rehab category indicator (0 = no; 1 = yes)
l_rehab_medium	Output	Numeric	Medium rehab category indicator (0 = no; 1 = yes)
l_rehab_low	Output	Numeric	Low rehab category indicator (0 = no; 1 = yes)
l_special_high	Output	Numeric	Special care high category indicator (0 = no; 1 = yes)
l_special_low	Output	Numeric	Special care low category indicator (0 = no; 1 = yes)
l_clin_complex	Output	Numeric	Clinically complex category indicator (0 = no; 1 = yes)
l_beh_cog	Output	Numeric	Behavior/cognition category indicator (0 = no; 1 = yes)
sRugHier	Output	Character	The grouper will return a 3-byte character code (e.g., "RUX") for the hierarchical RUG-IV group.
sRugMax	Output	Character	The grouper will return a 3-byte character code (e.g., "RUX") for the index maximized RUG-IV group. For Medicare, this code is recorded as the first 3 characters of MDS item Z0100A.
nRugHier	Output	Numeric	The grouper will return the numeric code for the hierarchical RUG-IV group. This is the numeric position of the group in the standard group order that is listed in Table 2 and in the grouper overview documentation ("RUGIV grouper overview V1.00.8 yyyyymmdd.pdf", where "yyyyymmdd" stands for the publication date).

Table 1. Standard Input and Output Parameters for the SAS Classification Code

Parameter Name	Parameter Type	Data Type	Description
nRugMax	Output	Numeric	The grouper will return the numeric code for the index maximized RUG-IV group. This is the numeric position of the group in the standard group order that is listed in Table 2 and in the grouper overview documentation ("RUGIV grouper overview V1.00.8 yyyyymmdd.pdf", where "yyyyymmdd" stands for the publication date).
nCmiValueHier	Output	Numeric	nCmiValueHier is a double-precision variable which on return will contain the case mix index value (from nCmiArray) corresponding to the resulting hierarchical RUG-IV group. Round this value to the number of decimal points in the CMI input array (nCmiArray) to retrieve the input value.
nCmiValueMax	Output	Numeric	nCmiValueMax is a double-precision variable which on return will contain the case mix index value (from nCmiArray) corresponding to the resulting index maximized RUG-IV group. Round this value to the number of decimal points in the CMI input array (nCmiArray) to retrieve the input value.
sRugHier_NT	Output	Character	The grouper will return a 3-byte character code (e.g., "RUX") for the hierarchical non-therapy RUG-IV group.
sRugMax_NT	Output	Character	The grouper will return a 3-byte character code (e.g., "RUX") for the index maximized non-therapy RUG-IV group. For Medicare, this code is recorded as the first 3 characters of MDS item Z0150A.
nRugHier_NT	Output	Numeric	The grouper will return the numeric code for the hierarchical non-therapy RUG-IV group. This is the numeric position of the group in the standard group order that is listed in Table 2 and in the grouper overview documentation ("RUGIV grouper overview V1.00.8 yyyyymmdd.pdf", where "yyyyymmdd" stands for the publication date).
nRugMax_NT	Output	Numeric	The grouper will return the numeric code for the index maximized non-therapy RUG-IV group. This is the numeric position of the group in the standard group order that is listed in Table 2 and in the grouper overview documentation ("RUGIV grouper overview V1.00.8 yyyyymmdd.pdf", where "yyyyymmdd" stands for the publication date).
nCmiValueHier_NT	Output	Numeric	nCmiValueHier is a double-precision variable which on return will contain the case mix index value (from nCmiArray) corresponding to the resulting hierarchical non-therapy RUG-IV group. Round this value to the number of decimal points in the CMI input array (nCmiArray) to retrieve the input value.

Table 1. Standard Input and Output Parameters for the SAS Classification Code

Parameter Name	Parameter Type	Data Type	Description
nCmiValueMax_NT	Output	Numeric	nCmiValueMax is a double-precision variable which on return will contain the case mix index value (from nCmiArray) corresponding to the resulting index maximized non-therapy RUG-IV group. Round this value to the number of decimal points in the CMI input array (nCmiArray) to retrieve the input value.
sRugsVersion	Output	Character	sRugsVersion is a string variable which returns the Logic Version code of the RUG-IV classification which was used. This version code will be the RUG-IV Logic Version ("1.00") plus the Model ("66", "57" or "48"). An example version code is "1.0066". This version code is recorded on the MDS at items Z0100B and Z0150B.
sDIIVersion	Output	Character	sDIIVersion is a string which returns a value of "1.00.8", the Code Version number for the present DLL and SAS grouper modules.
iError	Output	Numeric	<p>The grouper will return an integer error code. The error code will have one of the following values:</p> <ul style="list-style-type: none"> 0 = No grouper calling error, RUG-IV classification was calculated. 1 = sRehabType parameter was invalid. 2 = sModel parameter was invalid. 3 = RUG-IV not calculated for this type of MDS record. This code will always be returned for an entry record, a death in facility record, a discharge assessment record (not combined with an OBRA or PPS assessment), or an inactivation record. <p>This error code will also be returned if the reasons for assessment codes (MDS items A0310A, A0310B, A0310C, and A0310D) are invalid for RUG-IV classification.</p> <ul style="list-style-type: none"> 4 = Invalid CMI value used. No CMI value may be less than or equal to -9999 or value is greater than 9999. 5 = A start of therapy OMRA does not result in a Rehabilitation plus Extensive or Rehabilitation group. A start of therapy OMRA is always expected to give one of these groups.

Case Mix Indices

Table 2 describes the elements of the nCmiArray standard input parameter. Five standard CMI sets are available for index maximizing classification with Logic Version 1.00 of the RUG-IV Grouper. The CMI values for the CMI sets are provided in separate documents (“RUGIV CMI Doc V1.00 yyyyymmdd.pdf” and “RUGIV CMI sets V1.00.csv”, where “yyyyymmdd” stands for the publication date).

Table 2. Elements in nCmiArray[]

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
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

Table 2. Elements in nCmiArray[]

Group Number and CMI Array Element	RUG-IV Group
Extensive Groups for all models (66-, 57-, and 48-groups)	
24	SE3: Extensive Services Level 3 / ADL >= 2
25	SE2: Extensive Services Level 2 / ADL >= 2
26	SE1: 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

Table 2. Elements in nCmiArray[]

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

¹ Restorative

Using the SAS Code and Demo Programs

To use the RUG-IV Code Version 1.00.8 classification SAS code, follow these two steps:

1. Write a SAS program to read MDS 3.0 records into a SAS data set with the MDS 3.0 items having names corresponding to their labels on the form and their names in the standard MDS 3.0 data specifications (e.g., A0310A, B0100, etc.). The SAS data must include all MDS RUG-IV items (a list of the MDS RUG-IV items is available in Section 9 of the grouper overview document, “RUGIV grouper overview V1.00.8 yyyyymmdd.doc”, where “yyyyymmdd” stands for the date of publication). The grouper package includes the following Demo program which performs this function:
 - **Demo Read MDS3 Fixed Format Test File.sas**

Example SAS program for reading an MDS 3.0 test data file in the standard MDS 3.0 fixed length record format into a SAS data set for use with the “RUGIV V1.00.8.SAS” classification module. This program reads the input test file named “gp66_reh_other_test_v3.txt” and creates an output SAS data set named “gp66_reh_other_test_v3”. Note that the input test file and the output SAS data set both contain known classification results. Known classification results have a “K” prefix (e.g., KsRugHier – the known hierarchical classification group in the test record).
2. Write a SAS program to read SAS data set from step 1 to (1) set the required input parameters, (2) perform RUG-IV classification with the **RUGIV V1.00.8.sas** module, and (3) create an output SAS data set with the calculated results. The grouper package includes the Demo program which performs this function:
 - **Demo Perform RUG_IV Classification.sas**

Example SAS program for reading the input SAS data set “gp66_reh_other_test_v3”. This program sets the parameters appropriate to the test data file “gp66_reh_other_test_v3.txt” and then uses the **RUGIV V1.00.8.sas** module to perform RUG-IV classification with those parameters. The program outputs a new SAS data set “gp66_reh_other_test_v3_out” with the classification result variables appended to the variables from the input SAS data set. The calculated classification results (e.g., sRugHier) can then be compared to the known classification results from the original test record (e.g., KsRugHier).