Documentation for the RUG-III Version 5.20 Grouper

Iowa Foundation for Medical Care

August 9, 2005

This is general documentation for version 1 (v1) of the RUG-III Version 5.20 Grouper package. This grouper package was developed by the Iowa Foundation for Medical Care and by Stepwise Systems under the Quality Improvement and Evaluation System (QIES) contract with the Centers for Medicare & Medicaid Services (CMS).

The grouper package is available as a ZIP file named RUG520v1.ZIP on the CMS web site at:

http://www.cms.hhs.gov/medicaid/mds20/mdssoftw.asp

Technical Assistance. If you have questions which are not answered by the Version 5.20 Grouper package, 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 Version 5.20 of the RUG-III Grouper and contains the following sections:

Section 1. Introduction

This documentation describes the Version 5.20 of Grouper Package for the RUG-III model 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.

Version 5.20 implements the 2005 Refinement to the RUG-III model. This refinement adds a 53-group RUG-III model to the existing 34-group and 44-group models. The 53-group model consists of the 44-group model with 9 new groups added. The added groups identify high-cost residents who receive both rehabilitation therapy services and extensive care services.

Hierarchical vs. Index Maximizing Classification. Classification using any of the three models (34-group, 44-group, and 53-group) can be ***hierarchical*** or ***index maximizing***. In hierarchical classification, the resident is assigned to the first group for which they qualify, given the standard hierarchical order of the RUG-III categories and groups (see Section 4.). In hierarchical classification, if the resident qualifies for the Extensive Services category (e.g. group SE1) and the Special Care category (e.g., group SSC), then classification will be Extensive Services, since the Extensive Services category is higher than (above) the Special Care 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 SE1 and SSC, but SSC has the higher CMI, then index maximizing classification will be in the SSC group even though it is lower in the hierarchy.

Special Medicare Rehabilitation Qualification. Qualification in the Rehabilitation groups is usually based solely on the level of rehabilitation therapy received. However, in some cases Medicare SNF classification also considers rehabilitation therapy orders. For SNF PPS 5-day and readmission/return assessments, the Medicare SNF payment system bases Rehabilitation qualification on both rehabilitation therapy received and rehabilitation therapy ordered. Version 5.20 continues to apply such special Rehabilitation qualification for Medicare SNF PPS 5-day and readmission/return assessments.

34-Group Model. The 34-group model includes only 4 Rehabilitation groups. For this model, the group precedence for hierarchical classification is the Extensive Services groups, the 4 Rehabilitation groups in the 34-group model, the Special Care groups, the Clinically Complex groups, the Cognitively Impaired groups, the Behavior Problems groups, and the Reduced Physical Functions groups. The 34-group model is in use in Medicaid payment systems in many states.

44-Group Model. The 44-group model includes 14 Rehabilitation groups. For this model, the group precedence for hierarchical classification is the 14 Rehabilitation groups in the 44-group and 53-group models, the Extensive Services groups, the Special Care groups, the Clinically Complex

groups, the Cognitively Impaired groups, the Behavior Problems groups, and the Reduced Physical Functions groups. The 44-group model is in use in the Medicare SNF payment system through 12/31/2005 and is in use in Medicaid payment systems in several states.

53-Group Model. The 53-group model adds 9 new groups to the 44-group model for high-cost residents who qualify both for Rehabilitation and Extensive Services. These combined Rehabilitation/Extensive groups are placed at the top of the hierarchy. For this model, the group precedence for hierarchical classification is the 9 Rehabilitation/Extensive groups, the 14 Rehabilitation in the 44-group and 53-group models, the Extensive Services groups, the Special Care groups, the Clinically Complex groups, the Cognitively Impaired groups, the Behavior Problems groups, and the Reduced Physical Functions groups. The 53-group model will be used in Medicare SNF payment system beginning 01/01/2006.

Section 2. Files Available with the Grouper package

Files available with the RUG-III 5.20 Grouper Package are in a ZIP file named RUG520v1.ZIP. This ZIP file contains the following files:

- General Information Files
    - **Grouper Doc.pdf**

      This is the current document describing general features of the RUG-III Version 5.20 Grouper, including approach, RUG-III 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.
    - **Cmi520.xls**

      This is an Excel worksheet with the standard CMI sets in a format that will allow ease of coding.
- DLL Files
    - **DLL Doc.pdf**

      User documentation for the DLL, including instructions for calling the DLL from both C++ and Visual Basic.
    - **RUG520.DLL**

      The actual DLL (dynamic-link library) file for performing RUG-III Version 5.20 classification.
    - **RUG520.CPP**

      The C++ module used to perform RUG-III calculations in the DLL.
    - **RUG520.H**

      The C++ header file used to define the DLL and used for static linking.
    - **RUG520.LIB**

      A file required if the user wants to use static linking.
- C++ Demo Program Files
    - **Demo520_CPP1.ZIP**

C++ Demo #1 source code and executable for 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 (RUG520.lib) for DLL access.

- **Demo520_CPP2.ZIP**

  C++ Demo #2 code for calling the DLL and retrieving output results. Six files are included in the ZIP file. This code illustrates using LoadLibrary( ) to access the DLL access.

- Visual Basic 6 Demo Program Files
  - **Demo520_VB6.ZIP**

    VB6 Demo source code and executable for calling the DLL and retrieving output results. Four files are included in the ZIP file.
- Visual Basic .NET Demo Program Files
  - **Demo520_NET.ZIP**

    VB .NET Demo source code and executable for calling the DLL and retrieving output results. Eight files are included in the ZIP file.
- SAS Files
  - **SAS Doc.pdf**

    User documentation for the RUG-III Version 5.20 SAS code.
  - **RUG520.SAS**

    The actual SAS module for performing RUG-III Version 5.20 classification.
  - **Call520.SAS**

    Example SAS code for using the SAS classification module and retrieving the results.
  - **CMI*.SAS**

    SAS code modules (C01_CMI.SAS, C02_CMI.SAS, C03_CMI.SAS, C04_CMI.SAS, D01_CMI.SAS, and D02_CMI.SAS) for the standard CMI sets for Version 5.20. Note these SAS modules can be converted to C++ code for C++ users.
  - **Read_MDS.SAS**

    A SAS program to read MDS records in standard submission format and save to a SAS data set with MDS items named appropriately for the use with the SAS RUG-III classification module (RUG520.SAS).
- Test Data File Information
  - **Test520a_max Doc.pdf**

    Documentation for the test data file named "Test520a_max.txt" below.
  - **Test520a_max.txt**

    This test data file has 1002 MDS assessment records in standard MDS submission format. These records have been fabricated to thoroughly test the RUG-III classification logic. This test data file has known values for both hierarchical and

index maximizing classification for the 34-group, the 44-group, and the 53-group models.

- **Test520a_rural Doc.pdf**
  Documentation for the test data file named "Test520a_rural.txt" below.
- **Test520a_rural.txt**
  This test data file has 1002 MDS assessment records in standard MDS submission format. These records have been fabricated to thoroughly test the RUG-III classification logic. This test data file has known values for both hierarchical and index maximizing classification using SNF PPS rural CMIs and the special Medicare Rehabilitation qualification for the 44-group and the 53-group models.
- **Test520b_urban Doc.pdf**
  Documentation for the test data file named "Test520b_urban.txt" below.
- **Test520b_urban.txt**
  This test data file has 1896 MDS assessment records in standard MDS submission format. The RUG-III items in these records are from MDS 2.0 assessments performed in a number of states during 1995. No resident, facility, or state identification is present in these records and the assessment dates have been changed to dates in 2004. This test data file has known values for both hierarchical and index maximizing classification using SNF PPS urban CMIs and the special Medicare Rehabilitation qualification for the 44-group and the 53-group models.

- RUG44 to RUG53 Transition Information
  - **RUG44 to RUG53 Transition Specs.pdf**
    Documentation of the requirements for transitioning from RUG44 to RUG53 in MDS data systems.

Section 3. Approach and Features

In previous grouper versions, there were separate grouper modules for the available RUG-III models (34-group and 44-group). Version 5.20 of the RUG-III Grouper uses a single module to perform classifications with the 34-group model, the 44-group model, and the new 53-group model. When calling the module, the user specifies which model to use.

In previous grouper versions, the user was required to specify that classification use either hierarchical or index maximizing classification. If both types of classification were desired, then 2 separate calls to the grouper had to be made. Version 5.20 of the grouper always returns both hierarchical and index maximizing classification results. Both types of classification are obtained with a single call.

Version 5.20 continues to support special Medicare Rehabilitation qualification (ordered therapies are considered on SNF PPS 5-day and readmission/return assessments). If the user requests special Medicare Rehabilitation qualification, then both hierarchical and index maximizing results will be returned using that special qualification.

The previous grouper version provided RUG-III classification code in dBase/Clipper for the 34-group and 44-group models, SAS code for the 44-group model only, and a DLL based on Visual

Basic for the 44-group model only. Version 5.20 of the grouper provides a more complete array of products including:

- Working C++ classification code for all three models (34-group, 44-group, and 53-group).
- Working SAS classification code for all three models.
- A classification DLL based on C++ for all three models.

The new DLL has been developed in C++ to allow use with a wider range of platforms and has been tested with C++ and Visual Basic.

In previous versions of the grouper, the RUG-III groups and CMIs were listed in hierarchical order for the 44-group groups with the 34-group Rehabilitation groups appended at the bottom. This was awkward, since the 34-group Rehabilitation groups fell at the bottom of the list, below many groups they should precede hierarchically. In Version 5.20, the RUG-III groups from all three models have been placed in an order that is consistent with the hierarchical order for each of the three different models. The Rehabilitation/Extensive groups have been placed at the top, followed by the Rehabilitation groups in the 44-group and 53-group models, the Extensive Services groups, the Rehabilitation groups in the 34-group model, the Special Care groups, and the remaining lower categories in normal order. For each model some of the groups in the list will be inactive, but for all models the active groups will be in the appropriate order. The CMI array used in the grouper corresponds to the ordered list of groups. This configuration of the group list and the CMI array allows a single module to more easily perform classification for all three models.

Section 4. RUG-III Groups in Standard Order

Table 4-1 presents the RUG-III groups in standard hierarchical order. All groups from all three models (34-group, 44-group, and 53-group) are included in the listing in Table 4-1. For any specific model, some of the groups will be inactive. For example, the Rehabilitation/Extensive groups (groups 1-9) are only active in the 53-group model. One additional group (BC1) has been added at the bottom as group 58. BC1 is the default group assigned when there are MDS assessment data errors, precluding RUG-III classification. If any of the 108 MDS items required for RUG-III classification (see Section 8) are out of range, then the classification logic for RUG-III Grouper Version 5.20 may produce inappropriate results. Therefore, if any of the 108 items used in RUG-III are out of range, then normal classification is not attempted and the default BC1 classification is assigned.

The group order in Table 4-1 is also the array element order for the CMI array required for RUG-III classification with the grouper (see Section 9 for the CMI array values for the standard CMI sets).

Table 4-1. RUG-III Groups in Standard Order

Group Number and CMI Array Element	RUG3 Group
Rehabilitation/Extensive Groups for 53-group model	
1	RUX: Rehabilitation Ultra High Plus Extensive / ADL 16-18
2	RUL: Rehabilitation Ultra High Plus Extensive / ADL 7 – 15
3	RVX: Rehabilitation Very High Plus Extensive / ADL 16 – 18
4	RVL: Rehabilitation Very High Plus Extensive / ADL 7 - 15
5	RHX: Rehabilitation High Plus Extensive / ADL 13 - 18
6	RHL: Rehabilitation High Plus Extensive / ADL 7 – 12
7	RMX: Rehabilitation Medium Plus Extensive / ADL 15 – 18
8	RML: Rehabilitation Medium Plus Extensive / ADL 7 - 14
9	RLX: Rehabilitation Low Plus Extensive / ADL 7 - 18
44-Group Rehabilitation Groups for the 53-group and 44-group models	
10	RUC: Rehabilitation Ultra High / ADL 16 – 18
11	RUB: Rehabilitation Ultra High / ADL 9 – 15
12	RUA: Rehabilitation Ultra High / ADL 4 - 8
13	RVC: Rehabilitation Very High / ADL 16 – 18
14	RVB: Rehabilitation Very High / ADL 9 – 15
15	RVA: Rehabilitation Very High / ADL 4 - 8
16	RHC: Rehabilitation High / ADL 13 – 18
17	RHB: Rehabilitation High / ADL 8 – 12
18	RHA: Rehabilitation High / ADL 4 - 7
19	RMC: Rehabilitation Medium / ADL 15 – 18
20	RMB: Rehabilitation Medium / ADL 8 – 14
21	RMA: Rehabilitation Medium / ADL 4 - 7
22	RLB: Rehabilitation Low / ADL 14 – 18
23	RLA: Rehabilitation Low / ADL 4 – 13
Extensive Groups for all models (53-, 44-, and 34-groups)	

Table 4-1. RUG-III Groups in Standard Order

Group Number and CMI Array Element	RUG3 Group
24	SE3: Extensive Services 3 / ADL > 6
25	SE2: Extensive Services 2 / ADL > 6
26	SE1: Extensive Services 1 / ADL > 6
Rehabilitation Groups for the 34-group model	
27	RAD: Rehabilitation All Levels / ADL 17 - 18
28	RAC: Rehabilitation All Levels / ADL 14 – 16
29	RAB: Rehabilitation All Levels / ADL 9 - 13
30	RAA: Rehabilitation All Levels / ADL 4 - 8
Remaining Groups for all models (53-, 44-, and 34-groups)	
31	SSC: Special Care / ADL 17 – 18
32	SSB: Special Care / ADL 15 – 16
33	SSA: Special Care / ADL 4 – 14
34	CC2: Clinically Complex with Depression / ADL 17 - 18
35	CC1: Clinically Complex / ADL 17 – 18
36	CB2: Clinically Complex with Depression / ADL 12 - 16
37	CB1: Clinically Complex / ADL 12 – 16
38	CA2: Clinically Complex with Depression / ADL 4 - 11
39	CA1: Clinically Complex / ADL 4 – 11
40	IB2: Cog. Impairment with Nursing Rehab / ADL 6 - 10
41	IB1: Cognitive Impairment / ADL 6 – 10
42	IA2: Cog. Impairment with Nursing Rehab / ADL 4 - 5
43	IA1: Cognitive Impairment / ADL 4 - 5
44	BB2: Behavior Problem with Nursing Rehab / ADL 6 - 10
45	BB1: Behavior Problem / ADL 6 – 10
46	BA2: Behavior Problem with Nursing Rehab / ADL 4 - 5
47	BA1: Behavior Problem / ADL 4 - 5
48	PE2: Physical Function with Nursing Rehab / ADL 16 - 18

Table 4-1. RUG-III Groups in Standard Order

Group Number and CMI Array Element	RUG3 Group
49	PE1: Physical Function / ADL 16 – 18
50	PD2: Physical Function with Nursing Rehab / ADL 11 - 15
51	PD1: Physical Function / ADL 11 – 15
52	PC2: Physical Function with Nursing Rehab / ADL 9 - 10
53	PC1: Physical Function / ADL 9 – 10
54	PB2: Physical Function with Nursing Rehab / ADL 6 - 8
55	PB1: Physical Function / ADL 6 - 8
56	PA2: Physical Function with Nursing Rehab / ADL 4 - 5
57	PA1: Physical Function / ADL 4 - 5
58	BC1: RUG-III group not calculated due to data errors

Section 5. MDS Assessment Input Data

Version 5.20 of the RUG-III grouper requires that MDS 2.0 assessment data be provided in a string corresponding to the standard format for a data record or data modification record in an MDS 2.0 submission batch. Specifications for the standard data or modification record format can be found at:

http://www.cms.hhs.gov/medicaid/mds20/mdssoftw.asp

The input string required for the grouper is the 1812 byte format for the MDS 2.0 data record.

Section 6. Grouper Input and Output Parameters

Table 6-1 describes the input and output parameters used by the grouper. Before calling the grouper, you must "set" the input parameters to appropriate values for the type of RUG-III 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-III classification made.

Table 6-1. Input and Output Parameters for RUG-III Version 5.20

Parameter Name	Parameter Type	Data Type	Description
sMdsRecord	Input	String	A string containing the MDS record in standard format (length=1812 bytes).
sRehabType	Input	String	A string containing one of the following two values designating the type of rehab classification to perform: • "Mcare" = special Medicare rehabilitation classification (using ordered therapies in Section T on 5-day and readmission/return assessments) • "Other" = rehabilitation classification does not use ordered therapies in Section T Upper, lower, or mixed case is acceptable when supplying this parameter.
sModel	Input	String	A string containing one of the following three values designating the RUG-III model to use: • "53" = 53-group model • "44" = 44-group model • "34" = 34-group model
iQuarterlyFlag	Input	Integer or Long[1]	The quarterly flag is an integer value indicating whether RUG-III is to be calculated for quarterly assessments. 0 = RUG-III not calculated for quarterlies 1 = RUG-III is calculated for quarterlies The grouper will automatically determine whether the MDS record corresponds to a quarterly assessment.

[1] The data type of this parameter is Integer in C++, Visual Basic .NET, and SAS programs calling the Grouper and Long in Visual Basic 6 programs calling the Grouper.

Table 6-1. Input and Output Parameters for RUG-III Version 5.20

Parameter Name	Parameter Type	Data Type	Description
nCmiArray	Input	Double precision array	nCmiArray is a double-precision array containing case mix indices (CMIs). This array affects the index maximized RUG-III classification returned by the grouper. The array must be supplied even if you are not interested in the index maximized RUG-III classification. If you are not interested in index maximized results, you can initialize the array with zeroes and the index maximized RUG-III will equal the hierarchical RUG-III classification. For C++ and Visual Basic programs calling the grouper DLL, the array must be dimensioned from 0 to 58. Put the 58 CMI indices in elements 1 to 58 (element 0 can be initialized to 0.0). For SAS programs using the SAS grouper module, the array should be dimensioned with 58 elements and there is no "0" element. The RUG-III groups corresponding to the 58 elements in nCmiArray are listed in Section 4 of this document. The standard CMI sets available with Version 5.20 are available in Section 9.
sRugHier	Output	String	The grouper will return a 3-byte character code (e.g., "RUC") for the hierarchical RUG-III group. When you call the grouper, you should initialize this variable to a blank string. This code will be the default RUG-III group (BC1) if any of the 108 RUG-III MDS items are out of range.
sRugMax	Output	String	The grouper will return a 3-byte character code (e.g., "RUC") for the index maximized RUG-III group. When you call the grouper, you should initialize this variable to a blank string. This code will be the default RUG-III group (BC1) if any of the 108 RUG-III MDS items are out of range.
nRugHier	Output	Integer or Long[1]	The grouper will return the numeric code for the hierarchical RUG-III group. This is the numeric position of the group in the standard group order in Section 4. When you call the grouper, you should initialize this variable to a 0 value. Such numeric values have proved useful to researchers studying RUG-III. This numeric code will be that for the default RUG-III group (58) if any of the 108 RUG-IIIMDS items are out of range.

[1] The data type of this parameter is Integer in C++, Visual Basic .NET, and SAS programs calling the Grouper and Long in Visual Basic 6 programs calling the Grouper.

Table 6-1. Input and Output Parameters for RUG-III Version 5.20

Parameter Name	Parameter Type	Data Type	Description
nRugMax	Output	Integer or Long[1]	The grouper will return the numeric code for the index maximized RUG-III group. This is the numeric position of the group in the standard group order in Section 4. When you call the grouper, you should initialize this variable to a 0 value. Such numeric values have proved useful to researchers studying RUG-III. This numeric code will be that for the default RUG-III group (58) if any of the 108 RUG-III MDS items are out of range.
nCmiValueHier	Output	Double precision	nCmiValueHier is a double-precision variable which on return will contain the case mix index value (from nCmiArray) corresponding to the resulting hierarchical RUG-III value. When you call the grouper, you should initialize this variable to a 0.0 value.
nCmiValueMax	Output	Double precision	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-III value. When you call the grouper, you should initialize this variable to a 0.0 value.
iAdlSum	Output	Integer or Long[1]	iAdlSum is an integer variable which on return will contain the RUG-III ADL scale score (range of 4 to 18). When you call the grouper, you should initialize this variable to a 0 value.
iCpsCode	Output	Integer or Long[1]	iCpsCode is an integer variable which on return will contain the Cognitive Performance Scale (CPS) score (range of 0 to 6). When you call the grouper, you should initialize this variable to a 0 value.
sRugsVersion	Output	String	sRugsVersion is a string variable which returns the version of the RUG-III classification logic which was used. This will be a value of “07” for the 44-group model, “08” for the 34-group model, and “09” for the 53-group model. When you call the grouper, you should initialize this variable to a blank string.
sDllVersion	Output	String	sDllVersion is a string which returns a value of "1.00", the version number (within RUG-III Grouper Version 5.20) for the present DLL or SAS grouper module. When you call the grouper, you should initialize this variable to a blank string.

[1] The data type of this parameter is Integer in C++, Visual Basic .NET, and SAS programs calling the Grouper and Long in Visual Basic 6 programs calling the Grouper.

Table 6-1. Input and Output Parameters for RUG-III Version 5.20

Parameter Name	Parameter Type	Data Type	Description
iError	Output	Integer or Long[1]	The grouper will return an integer error code. The error code will have one of the following values: 0 = No grouper calling error, RUG-III was calculated or set to the default value if out-of-range values were found for any RUG-III item 1 = sRehabType parameter was invalid 2 = sModel parameter was invalid 3 = iQuarterlyFlag parameter was invalid 4 = RUG-III not calculated for this type of MDS record. This code will always be returned for an MDS batch header record, MDS batch trailer record, discharge record, reentry record, or inactivation record. It will also be returned for a quarterly assessment if the user has indicated that RUG-III is not to be calculated for quarterly assessments (iQuarterlyFlag = 0). Finally, this error code will also be returned if the reasons for assessment codes (MDS items AA8a and AA8b) are invalid (e.g., out of range). 5 = Invalid CMI value used. No CMI value may be less than or equal to –9999.

Section 7. MDS Record Screening

When the MDS 2.0 data record standard 1812 byte string (see Section 5) is provided to the grouper, the string is examined to determine if this MDS record is appropriate for classification.

First, the grouper examines the first 2 bytes of the string (named REC_ID in the standard data specifications). These 2 bytes must be "B0" (B followed by zero) for an MDS data record or "M0" for an MDS data modification record. If these first 2 bytes are any other value, then the grouper will skip normal RUG-III classification, set all output parameters to default values--blank strings for output string parameters and appropriate 0 (zero) values for output numeric parameters, and return an iError parameter value of 4 (indicating RUG-III classification is not appropriate for this type of record). Note that if all records in a standard MDS submission batch (with an initial batch header record and a final batch trailer record) are submitted to the grouper, then classification will occur for the data and modification records but will be skipped (with iError returned as 4) for the header record, the trailer record, and any inactivation request records, since the string for the header record starts with "A0", the string for the trailer records starts with "Z0", and the string for an inactivation request starts with "X0".

After determining the MDS string represents a data record or modification record, the grouper examines the MDS reasons for assessment in items AA8a and AA8b. Classification is performed if any of the following conditions are met:

- The record is for a full assessment:
  AA8a = "01" or AA8a = "02" or AAa8a = "03" or AA8a = "04".
- The record is for a quarterly assessment and the iQuarterlyFlag input parameter indicates that quarterlies should be processed:
  (AA8a = "05" or AA8a = "10") and iQuarterlyFlag = 1.
- The record is for a SNF PPS assessment:
  AA8b = "1" or AA8b = "2" or AA8b = "3" or AA8b = "4" or AA8b = "5" or AA8b = "7" or AA8b = "8".
- The record is for an other state-required assessment:
  AA8a = "00" and AA8b = "6".
- The record is for an other type assessment:
  AA8a = "00" and AA8b = " ".

For all other data records, the grouper will skip normal RUG-III classification, set all output parameters to default values--blank strings for output string parameters and appropriate 0 (zero) values for output numeric parameters, and return an iError parameter value of 4 (indicating RUG-III classification is not appropriate for this type of record). This will include discharge records, reentry records and inactivation records, as well as quarterly assessment records when classification is not requested for quarterlies (iQuarterlyFlag = 0).

Section 8. MDS Items Used in RUG-III

Table 8-1 lists the 108 MDS items used for RUG-III classification. The table also provides the range of valid values for each item. In the range lists, an "sp" refers to a single blank space, "sp(2)" to 2 blank spaces, etc. If any of the 108 items used in RUG-III is out of range, then normal classification is not attempted and the default BC1 classification is assigned.

Table 8-1. MDS Items Used in RUG-III

RUG Item #	MDS Label	RANGE
1	aa8b	'1','2','3','4','5','6','7','8',sp
2	b1	'0','1','-'
3	b2a	'0','1','-',sp
4	b4	'0','1','2','3','-',sp
5	c4	'0','1','2','3','-',sp
6	e1a	'0','1','2','-',sp
7	e1b	'0','1','2','-',sp
8	e1c	'0','1','2','-',sp
9	e1d	'0','1','2','-',sp

Table 8-1. MDS Items Used in RUG-III

RUG Item #	MDS Label	RANGE
10	e1e	'0','1','2','-',sp
11	e1f	'0','1','2','-',sp
12	e1g	'0','1','2','-',sp
13	e1h	'0','1','2','-',sp
14	e1i	'0','1','2','-',sp
15	e1j	'0','1','2','-',sp
16	e1k	'0','1','2','-',sp
17	e1l	'0','1','2','-',sp
18	e1m	'0','1','2','-',sp
19	e1n	'0','1','2','-',sp
20	e1o	'0','1','2','-',sp
21	e1p	'0','1','2','-',sp
22	e4aa	'0','1','2','3','-',sp
23	e4ba	'0','1','2','3','-',sp
24	e4ca	'0','1','2','3','-',sp
25	e4da	'0','1','2','3','-',sp
26	e4ea	'0','1','2','3','-',sp
27	g1aa	'0','1','2','3','4','8','-'
28	g1ab	'0','1','2','3','8','-'
29	g1ba	'0','1','2','3','4','8','-'
30	g1bb	'0','1','2','3','8','-'
31	g1ha	'0','1','2','3','4','8','-'
32	g1ia	'0','1','2','3','4','8','-'
33	g1ib	'0','1','2','3','8','-'
34	h3a	'0','1','-'
35	h3b	'0','1','-'
36	i1a	'0','1','-'
37	i1r	'0','1','-'
38	i1s	'0','1','-'
39	i1v	'0','1','-'
40	i1w	'0','1','-'
41	i1z	'0','1','-'
42	i2e	'0','1','-'
43	i2g	'0','1','-'
44	j1c	'0','1','-'
45	j1e	'0','1','-'
46	j1h	'0','1','-'
47	j1i	'0','1','-'
48	j1j	'0','1','-'
49	j1o	'0','1','-'
50	k3a	'0','1','-'
51	k5a	'0','1','-'

Table 8-1. MDS Items Used in RUG-III

RUG Item #	MDS Label	RANGE
52	k5b	'0','1','-'
53	k6a	'0','1','2','3','4','-',sp
54	k6b	'0','1','2','3','4','5','-',sp
55	m1a	'0','1','2','3','4','5','6','7','8',9'-'
56	m1b	'0','1','2','3','4','5','6','7','8',9'-'
57	m1c	'0','1','2','3','4','5','6','7','8',9'-'
58	m1d	'0','1','2','3','4','5','6','7','8',9'-'
59	m2a	'0','1','2','3','4','-'
60	m4b	'0','1','-'
61	m4c	'0','1','-'
62	m4g	'0','1','-'
63	m5a	'0','1','-'
64	m5b	'0','1','-'
65	m5c	'0','1','-'
66	m5d	'0','1','-'
67	m5e	'0','1','-'
68	m5f	'0','1','-'
69	m5g	'0','1','-'
70	m5h	'0','1','-'
71	m6b	'0','1','-'
72	m6c	'0','1','-'
73	m6f	'0','1','-'
74	n1a	'0','1','-'
75	n1b	'0','1','-'
76	n1c	'0','1','-'
77	o3	'0','1','2','3','4','5','6','7','-'
78	p1aa	'0','1','-'
79	p1ab	'0','1','-'
80	p1ac	'0','1','-'
81	p1ag	'0','1','-'
82	p1ah	'0','1','-'
83	p1ai	'0','1','-'
84	p1aj	'0','1','-'
85	p1ak	'0','1','-'
86	p1al	'0','1','-'
87	p1baa	'0','1','2','3','4','5','6','7','-'
88	p1bab	'0000' thru '9999' or '----'
89	p1bba	'0','1','2','3','4','5','6','7','-'
90	p1bbb	'0000' thru '9999' or '----'
91	p1bca	'0','1','2','3','4','5','6','7','-'
92	p1bcb	'0000' thru '9999' or '----'
93	p1bda	'0','1','2','3','4','5','6','7','-'

Table 8-1. MDS Items Used in RUG-III

RUG Item #	MDS Label	RANGE
94	p3a	'0','1','2','3','4','5','6','7','-'
95	p3b	'0','1','2','3','4','5','6','7','-'
96	p3c	'0','1','2','3','4','5','6','7','-'
97	p3d	'0','1','2','3','4','5','6','7','-'
98	p3e	'0','1','2','3','4','5','6','7','-'
99	p3f	'0','1','2','3','4','5','6','7','-'
100	p3g	'0','1','2','3','4','5','6','7','-'
101	p3h	'0','1','2','3','4','5','6','7','-'
102	p3i	'0','1','2','3','4','5','6','7','-'
103	p3j	'0','1','2','3','4','5','6','7','-'
104	p7	'00' thru '14' or '--'
105	p8	'00' thru '14' or '--'
106	t1b	'0','1','-',sp
107	t1c	'00' thru '15' or '--' or sp(2)
108	t1d	'0000' thru '9999' or '----' or sp(4)

Section 9. Standard Case Mix Index (CMI) Sets

Six standard CMIs sets are available with Version 5.20 of the RUG-III Grouper. The CMI values for these six CMI sets are listed in Table 9-1. These six sets and their standard usage are as follows:

- **Set C01.** This is the SNF PPS set in use for ***rural*** facilities in the Medicare program through 12/31/2005. Set C01 is appropriate to the 44-group model and is based upon the national average rural total payment rates (in descending order) from the original 1998 SNF PPS rule. This set is exactly the same as Set A01 available with the previous grouper version (5.12). Set C01 replaces Set A01 in version 5.20 to conform to the new list of 58-groups needed for version 5.20.
- **Set C02.** This is the SNF PPS set in use for ***urban*** facilities in the Medicare program through 12/31/2005. Set C02 is appropriate to the 44-group model and is based upon the national average urban total payment rates (in descending order) from the original 1998 SNF PPS rule. This set is exactly the same as Set A02 available with the previous grouper version (5.12). Set C02 replaces Set A02 in version 5.20 to conform to the new list of 58-groups needed for version 5.20.
- **Set C03.** This is the SNF PPS set in use for ***rural*** facilities in the Medicare program beginning on 01/01/2006. Set C03 is a new set appropriate to the 53-group model and is based upon the national average rural total payment rates (in descending order) for the 53-group RUG-III model in the FY2006 final rule.
- **Set C04.** This is the SNF PPS set in use for ***urban*** facilities in the Medicare program beginning on 01/01/2006. Set C04 is a new set appropriate to the 53-group model and is

based upon the national average urban total payment rates (in descending order) for the 53-group RUG-III model in the FY2006 final rule.

- **Set D01.** This is a set for the 34-group model based only on nursing staff time from the most recent nursing home staff time studies (1995 and 1997). This set is exactly the same as Set B01 available with the previous grouper version (5.12). Set D01 replaces Set B01 in version 5.20 to conform to the new list of 58-groups needed for version 5.20.
- **Set D02.** This is a set for the 44-group model based only on nursing staff time from the most recent nursing home staff time studies (1995 and 1997). This set is exactly the same as Set B02 available with the previous grouper version (5.12). Set D02 replaces Set B02 in version 5.20 to conform to the new list of 58-groups needed for version 5.20.

Table 9-1. Standard Case Mix Index (CMI) Sets

		CMI Values					
		SET C01	SET C02	SET C03	SET C04	SET D01	SET D02
GROUP NUMBER	GROUP CODE	44-GRP PPS RURAL	44-GRP PPS URBAN	53-GRP PPS RURAL	53-GRP PPS URBAN	34-GRP NURS ONLY	44-GRP NURS ONLY
0	None	0	0	0	0	0	0
1	RUX	0	0	53	53	0	0
2	RUL	0	0	52	52	0	0
3	RVX	0	0	48	49	0	0
4	RVL	0	0	46	46	0	0
5	RHX	0	0	42	42	0	0
6	RHL	0	0	41	41	0	0
7	RMX	0	0	47	47	0	0
8	RML	0	0	44	44	0	0
9	RLX	0	0	32	33	0	0
10	RUC	44	44	51	51	0	1.43
11	RUB	43	43	50	50	0	1.05
12	RUA	42	42	49	48	0	0.85
13	RVC	41	41	45	45	0	1.24
14	RVB	40	40	43	43	0	1.14
15	RVA	38	37	40	38	0	0.89
16	RHC	39	39	39	39	0	1.30
17	RHB	36	35	37	37	0	1.16
18	RHA	33	33	35	34	0	0.96
19	RMC	37	38	36	36	0	1.48
20	RMB	34	34	34	35	0	1.20
21	RMA	32	32	33	32	0	1.06
22	RLB	31	30	30	30	0	1.22
23	RLA	26	25	26	24	0	0.87
24	SE3	35	36	38	40	2.10	1.86
25	SE2	30	31	31	31	1.79	1.52
26	SE1	29	29	29	29	1.54	1.28

Table 9-1. Standard Case Mix Index (CMI) Sets

GROUP NUMBER	GROUP CODE	CMI Values					
		SET C01	SET C02	SET C03	SET C04	SET D01	SET D02
		44-GRP PPS RURAL	44-GRP PPS URBAN	53-GRP PPS RURAL	53-GRP PPS URBAN	34-GRP NURS ONLY	44-GRP NURS ONLY
27	RAD	0	0	0	0	1.66	0
28	RAC	0	0	0	0	1.31	0
29	RAB	0	0	0	0	1.24	0
30	RAA	0	0	0	0	1.07	0
31	SSC	28	28	28	28	1.44	1.24
32	SSB	25	26	25	26	1.33	1.15
33	SSA	24	24	24	25	1.28	1.11
34	CC2	27	27	27	27	1.42	1.23
35	CC1	23	23	23	23	1.25	1.08
36	CB2	22	22	22	22	1.15	1.00
37	CB1	21	21	21	21	1.07	0.92
38	CA2	20	20	20	20	1.06	0.91
39	CA1	17	17	17	17	0.95	0.82
40	IB2	14	14	14	14	0.88	0.76
41	IB1	12	12	12	12	0.85	0.73
42	IA2	8	8	8	8	0.72	0.63
43	IA1	6	6	6	6	0.67	0.58
44	BB2	13	13	13	13	0.86	0.75
45	BB1	11	11	10	10	0.82	0.71
46	BA2	7	7	7	7	0.71	0.61
47	BA1	2	2	2	2	0.60	0.52
48	PE2	19	19	19	19	1.00	0.86
49	PE1	18	18	18	18	0.97	0.84
50	PD2	16	16	16	16	0.91	0.78
51	PD1	15	15	15	15	0.89	0.73
52	PC2	10	10	11	11	0.83	0.72
53	PC1	9	9	9	9	0.81	0.70
54	PB2	5	5	5	5	0.65	0.56
55	PB1	4	4	4	4	0.63	0.55
56	PA2	3	3	3	3	0.62	0.53
57	PA1	1	1	1	1	0.59	0.51
58	BC1	1	1	1	1	0.59	0.51

Section 10. Using the DLL

The dynamic-link library (DLL) provided with Grouper Version 5.20 is named RUG520.DLL and this DLL performs all standard RUG-III classifications for that version. A separate

document (DLL Doc.pdf) provides instructions for calling the DLL from C++, Visual Basic 6, and Visual Basic .NET.

Section 11. Using the SAS Code

A standard SAS code module provided with Grouper Version 5.20 is named RUG520.SAS and this SAS code performs all standard RUG-III classifications for that version. A separate document (SAS Doc.pdf) provides instructions for using the standard SAS code module.

Section 12. Standard Test Data Files

There are three test data files provided with Grouper Version 5.20: an index maximizing test data file (Test520a_max.txt), a SNF PPS rural test data file (Test520a_rural.txt), and a SNF PPS urban test data file (Test520b_urban). The first 2 data files (beginning with "Test520a") are based on a set of 1002 MDS data records manually fabricated to test all features of the RUG-III classification logic. The third test data file (beginning with "TEST520b") is "real" MDS data based on a set of 1896 MDS 2.0 assessments performed in a number of states during the 1995 Nursing Home Staff Time Measurement Study. No resident, facility, or state identification is present in these records and the assessment dates have been changed to dates in 2004.

Each of the 3 test files is in standard MDS batch submission format and includes a standard batch header record before the data records and a standard batch trailer record after the data records. Each of the 3 test data files is described in turn.

Index Maximizing Test File

File Name:

Test520a_max.txt

Number of Records:

1002 data records plus a header and trailer record.

Description:

This file contains known results. All results are for standard rehabilitation classification with ordered therapies ignored--the parameter sRehabType was set to "Other" (see parameter documentation in Section 6). The known results in this file are:

- 34-group hierarchical classification.
- 34-group index maximizing classification using the D01 CMI set.
- 44-group hierarchical classification.
- 44-group index maximizing classification using the D02 CMI set.
- 53-group hierarchical classification.
- 53-group index maximizing classification using the C03 CMI set.

Further Documentation:

Further documentation for this file and the locations of the known results (record offsets) in the data record are given in the document Test520a_max.pdf.

PPS Rural Test File

File Name:

Test520a_rural.txt

Number of Records:

1002 data records plus a header and trailer record.

Description:

This file contains known results. All results are for Medicare rehabilitation classification with ordered therapies considered--the parameter sRehabType was set to "Mcare" (see parameter documentation in Section 6). The known results in this file are:

- no 34-group classifications present.
- 44-group hierarchical classification.
- 44-group index maximizing classification using the C01 CMI set.
- 53-group hierarchical classification.
- 53-group index maximizing classification using the C03 CMI set.

Further Documentation:

Further documentation for this file and the locations of the known results (record offsets) in the data record are given in the document Test520a_rural.pdf.

PPS Urban Test File

File Name:

Test520b_urban.txt

Number of Records:

1896 data records plus a header and trailer record.

Description:

This file contains known results. All results are for Medicare rehabilitation classification with ordered therapies considered--the parameter sRehabType was set to "Mcare" (see parameter documentation in Section 6). The known results in this file are:

- no 34-group classifications present.
- 44-group hierarchical classification.
- 44-group index maximizing classification using the C02 CMI set.
- 53-group hierarchical classification.
- 53-group index maximizing classification using the C04 CMI set.

Further Documentation:

Further documentation for this file and the locations of the known results (record offsets) in the data record are given in the document Test520b_urban.pdf.

Section 13. Version History

This is the initial version (Version 1 or v1) of the RUG 5.20 Grouper package.

