

# *Centre for Health Services Studies*

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IDENTIFICATION OF  
REGISTERED  
NURSING CARE TEACHERS  
IN STUDENTS  
UK TRAINING HOSPITALS  
USING THE  
MARRAS AND RUG-III

*May 2001*

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**UNIVERSITY OF KENT**  
**AT CANTERBURY ■■■■**

# **Identification of registered nursing care time for residents of UK Nursing Homes using the MDS/RAI and RUG-III**

**A study funded by the Joseph Rowntree Foundation**

## **REPORT OF THE PRELIMINARY FINDINGS**

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# **Using the Minimum Data Set Resident Assessment Instrument (MDS/RAI) and the Resource Utilisation Groups version III casemix system (RUG III) as a basis for reimbursement of nursing care**

## **Preliminary Report**

### **Summary**

Given the ongoing growth of the elderly population, and the proposed changes to the long-term care payment system in the U.K., finding a tool that accurately identifies the distribution of registered nursing care time between residents is imperative.

This study was established to determine whether a combination of RUG-III and MDS/RAI assessment instruments (see box 2) could identify residents of long-term care who require and are receiving registered nursing care. It has two components, a quantitative study of the time spent caring for people and a qualitative study based on interviews with registered nurse and care assistant staff of participating homes. This briefing summarises the findings of the quantitative study.

The time study in four nursing homes suggests that the RUG-III system effectively differentiates between nursing home residents who are receiving “standard” and “enhanced” Registered General Nursing (RGN) care time. The system could provide the basis of a re-imburement system for registered nursing time in long-term care facilities in the UK.

### **The research**

A review conducted prior to commencement of the field work examined the various methods by which researchers have assessed the need for registered nursing care, including workload measurement systems, the RCN Assessment Tool for nursing older people and the Resource Utilisation Groups Version III (RUG-III) case mix system (see box 1).

The field work aimed to answer two questions:

- Does a combination of RUG-III and MDS/RAI assessment data identify residents of long term care who require and are receiving registered nursing care?
- Can these data provide the basis of a practicable re-imburement system for registered nursing time that the residents require?

A description of the MDS/RAI and RUG III instrument is provided in box 2.

## **Box 1**

### **Methods of assessing the need for registered nursing care**

#### **Workload Analysis**

Although several studies reported on the effectiveness of workload analysis others cautioned against simply concentrating on the tasks that nurses perform and argued that decision-making is a key part of the nurse's role but is difficult to quantify as it is not an observable task. A further difficulty associated with workload analysis systems is that they may not account for the environmental factors associated with care provision, such as geographical situation, case mix, facility size and services available. A further criticism of workload analysis is that it ignores a nurse's ability to meet several needs simultaneously when providing care for individual residents. Furthermore, although workload measurement systems describe how different grades of nurse spend their time providing various kinds of care, they do little to explain the variation in the costs involved in caring for specific individuals.

#### **RCN Assessment Tool**

The RCN Assessment Tool was specifically designed to determine older people's need for registered nursing care and therefore help to determine the costs involved in their care. Although demonstrated to be an acceptable instrument by nurses in determining the need for registered nursing, there is as yet little published research demonstrating the validity or reliability of the RCN Assessment Tool in determining required nursing time.

#### **The RUG-III case mix system**

The RUG-III system has undergone extensive tests of validity and reliability in various care settings around the world and has proven utility in explaining variance in care time between residents. RUG-III provides an objective assessment of a variety of clinical characteristics.<sup>1,2,3</sup> Time studies in evaluation of the RUG-III system have used a self-report time study design that helps to control for environmental factors by using differential care time between residents as the basis of analysis.

A full copy of this review is available from CHSS, University of Kent at Canterbury.

The sample included 193 residents of four nursing homes from three different locations and care providers, including Brunelcare in Bristol, BUPA Care Homes in Liverpool, and the Joseph Rowntree Foundation in York. A total of 24 RGNs and 56 CAs participated in the study.

Full MDS/RAI assessments were completed for residents in the Brunelcare and Joseph Rowntree Foundation nursing homes. The BUPA nursing home residents were assessed using a stand-alone RUG-III assessment. The RUG-III groups for each resident were extracted directly from MDS computer records or by inputting the RUG-III assessments into a PC based RUG-III application.

## **Box 2**

### **MDS/RAI and RUG III instrument**

The MDS/RAI consists of the MDS 2.0 and its associated Resident Assessment Protocols (RAPs)<sup>4,5</sup>. The MDS 2.0 is a clinical tool designed to be used by nursing staff for the assessment of the resident and development of individual care plans. The MDS consists of a core set of assessment items that allows the health care professional to collect multiple data during a single assessment. This information can be used to present a comprehensive evaluation of a resident's clinical characteristics, such as functional ability, cognitive status, health conditions and psychosocial well-being.

The RUG-III system uses a sub-set of MDS 2.0 assessments items to group residents according to how much care time they receive. The system classifies residents into 7 clinically relevant groupings including: 'rehabilitation,' 'requiring extensive services,' 'requiring special care,' 'clinically complex,' 'impaired cognition,' 'behavioural problems' and 'reduced physical functioning.' Resource use is highest in the first group and lowest in the last. ADL score, presence of depression and nursing rehabilitation input then subdivide each Clinical Group to give a final RUG Group. The RUG-III assessment items can be extracted from MDS assessments or completed as "stand-alone" assessments. Stand alone RUG assessments take an average 4 minutes to complete per resident once nursing staff are familiar with the resident and the assessment.

The relative cost of care (direct + indirect care time) for a resident in a given RUG group is expressed as the "case mix index" (CMI). The CMI for a RUG-III group is the time cost of caring for the average resident in that group compared with the average resident in the total population. The mean CMI of the population is 1. Therefore, a RUG group with a CMI of 1.7 indicates that residents in that RUG group receive 70% more care time than the average resident. A RUG group with a CMI of 0.3 indicates that these residents receive only 30% of the care time of an average resident.

A time study recorded staff/resident contact time over a 24-hour period. Using a time-sheet carried for the duration of their shift, care staff recorded the time spent with individual residents on direct and indirect care. Direct care time was defined as time spent in hands on care. Indirect care time included all time spent on care-planning, staff supervision, discussion with carers, relatives or other professionals etc. when that time could be allocated to a specific resident. Staff also recorded time spent in non-care activities. At the end of each shift the total recorded time was reconciled with total shift time. Staff grades were recorded allowing staff to be identified as registered nurses (RGN) or care assistants (CA). For the analysis of variance explanation of the RUG system (its effectiveness in explaining which residents receive different amounts of care time), staff time was wage-weighted to reflect the fact that registered nurse care time is more expensive than care assistant time.

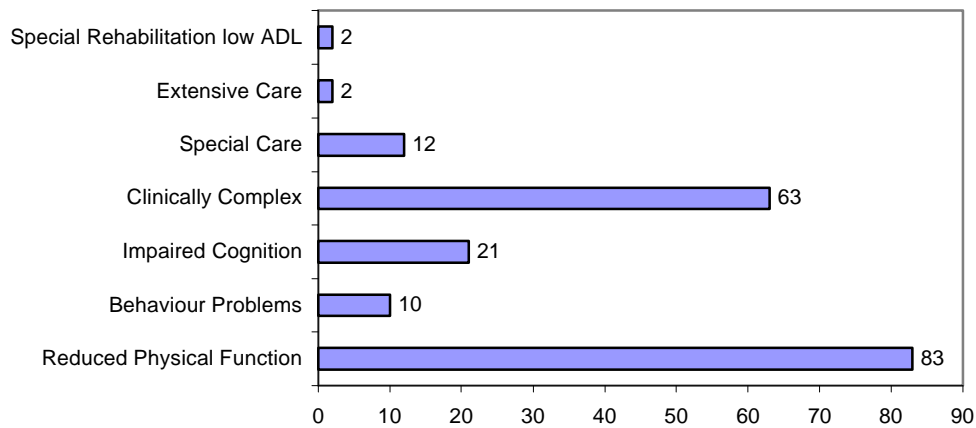
Resident-specific care time for residents in different RUG-III groups was compared. Validity of RUG-III groups for explaining the distribution of care time between residents was tested. The difference in direct and indirect care provided by RGNs and CAs to residents in the RUG-III clinical groups was compared.

## Summary of Preliminary Findings

The number of residents in each of the seven main RUG-III clinical groups is shown in figure 1 (see appendix for the definitions of each group). There were no residents in the three most resource intensive rehabilitation groups and only two residents in each of the special rehabilitation low ADL group (1.0%) and extensive care group (1.0%). In fact, as was expected for a nursing home population, the majority of residents were in the reduced physical function group (43.0%). Although these individuals failed to meet the criteria for the other six groups they require some type of daily nursing input. This is likely to include ongoing assessment, care planning and supervision of CA's. There was a high percentage of residents in the clinically complex group (32.6%), and significant numbers in the special care (5.7%), impaired cognition (10.9%), and behaviour problem (5.2%) groups.

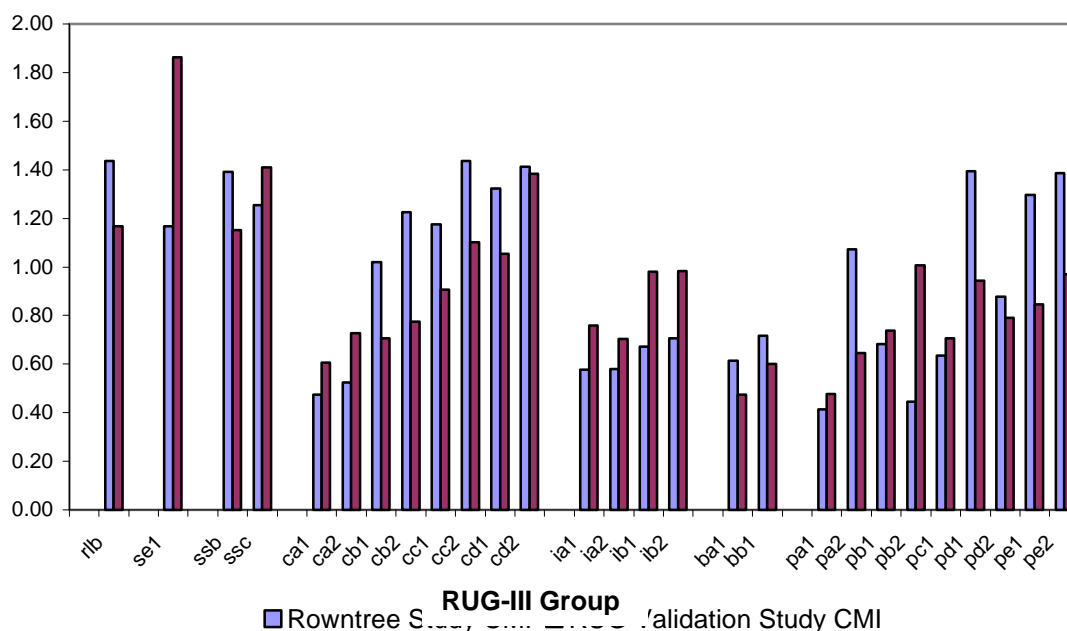
**Figure 1.**

**Distribution of Residents by RUG-III Clinical Groups**



The distribution of CMI's in this study followed a similar pattern to that of the original UK hospital based validation study (figure 2).

**Figure 2.**  
**Comparison of Casemix Indices of RUG-III Groups from Joseph Rowntree Foundation Study and Inpatient RUG Validation Study**



The percent of the variance in care time between residents explained by RUG-III for this study is shown in table 1. Any figure above 30% is considered useful. The amount explained in this research is in line with other published studies, demonstrating that the RUG-III system is a valid measure of care time and therefore likely to be applicable to all nursing homes in the UK.

**Table 1.**  
**Variance Explanation of distribution of care time between RUG-III groups in each home**

Home	Percent of variance explained*
Home no. 1 (n=55)	39
Home no. 2 (n=29)	83
Home no. 3 (n=53)	57
Home no. 4 (n=56)	71
Total	56

\* = Eta<sup>2</sup>, p<0.0001

Table 2 shows the distribution of RGN and CA direct and indirect care time between RUG-III clinical groups. There was a clear difference between the care provided to residents in the RUG-III clinical groups that include those with particular medical and nursing needs (clinically complex and above) compared with residents with primarily cognitive impairment or physical problems only (impaired cognition and below). As can be seen in Table 2, when compared with residents in the lower RUG-III clinical groups, residents in clinically complex and above received more than twice as much indirect RGN care time and 1.4 times as much direct RGN and direct CA time. There was very little indirect care provided by CAs.

**Table 2****Average Minutes per 24 hours for each resident by RUG-III Clinical Group**

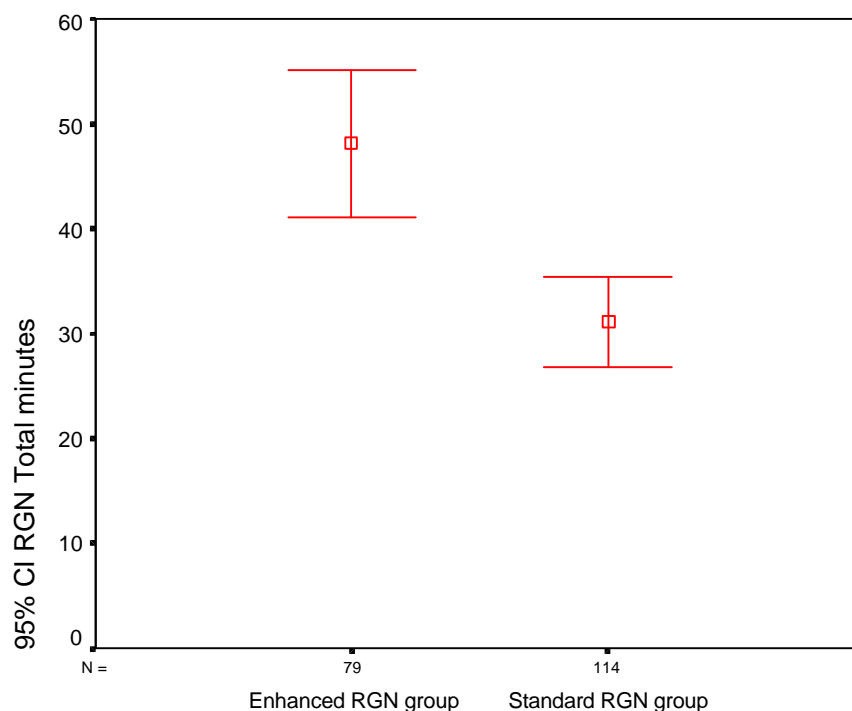
RUG-III Clinical Group	RGN Mean	RGN Mean	CA Mean	CA Mean
	Direct Care Minutes (std. dev.)	Indirect Care Minutes (std. dev.)	Direct Care Minutes (std. dev.)	Indirect Care Minutes (std. dev.)
Special Rehabilitation low ADL (n=2)	25.0 (14.1)	12.5 (17.7)	131.0 (33.9)	12.0 (17.0)
Extensive Care (n=2)	41.5 (40.3)	22.5 (3.5)	349.0 (339.0)	2.0 (2.8)
Special Care (n=12)	41.3 (29.2)	12.8 (13.4)	91.5 (57.3)	1.8 (4.7)
Clinically Complex (n=63)	34.3 (22.4)	12.6 (13.6)	91.5 (40.6)	3.0 (5.7)
Total Clinically Complex and above (n=79)	35.3 (23.3)	12.9 (13.4)	101.6 (74.3)	3.0 (5.9)
Impaired Cognition (n=21)	23.1 (15.9)	4.4 (7.9)	51.4 (31.7)	1.2 (2.2)
Behaviour Problems (n=10)	28.0 (18.6)	5.1 (6.1)	47.4 (23.5)	4.5 (7.4)
Reduced Physical Function (n=83)	25.7 (20.3)	6.1 (10.9)	81.7 (63.2)	2.7 (4.7)
Total below clinically complex (n=114)	25.4 (19.3)	5.7 (10.1)	73.1 (57.6)	2.6 (4.7)
Ratio of clin. complex:< clin. complex	1.4**	2.3*	1.4**	1.1***

\* t-test  $p < 0.001$ , \*\* t-test,  $p < 0.01$ , \*\*\* t-test n.s.

There is a clear difference in the RGN care time provided to residents in the Clinically Complex and above (enhanced RGN group) compared with those in the groups below Clinically Complex (standard RGN group). Residents in the enhanced RGN care group received an average of 48.1 mins. in 24 hours (95% CI 41.1-55.2) compared with an average of 31.1 mins. (95% CI 26.8 – 35.5) for those in the standard RGN care group (Figure



**Figure 3**  
**Mean RGN time per 24 hours for residents in the Enhanced RGN group compared with those in the Standard RGN group (showing 95% confidence intervals)**



## Conclusions

In spite of the relatively small sample size, the RUG-III system has been shown to be a valid means of differentiating the amount of care time provided to residents in this study explaining 56% of the variance in resource use.

The RUG-III system also showed a clear difference in care time given to residents, with more provided by RGNs to residents with more complex medical and nursing conditions when compared with less complex conditions.

The findings suggest that the RUG system could provide a valid basis for differentiating the amount of registered nurse care time provided to residents of nursing homes. All residents in the nursing homes received RGN care. At the simplest level, residents could be grouped into those receiving standard RGN care (RUG groups below Clinically Complex) and those receiving enhanced RGN care (Clinically Complex and above).

### *Proposed funding model*

The RUG-III case mix system is a valid system for predicting the relative amount of care time residents in different RUG groups receive and is not a care-planning instrument. To date there does not appear to be any valid system for predicting how much registered nursing care time residents *should* receive nor a basis for making such an estimate. The findings of the current study demonstrate how the proportion of registered nurse care time is distributed between residents and on the basis of current evidence the conclusions can be taken with confidence.

From these findings, it is clear that the RUG-III system effectively differentiated care time provided to nursing home residents and could form the basis for a re-imbursement system for defining the amount of RGN time required in the UK. This system is simple to use and could be established in nursing homes immediately. It can operate in either a paper-based or computer-oriented format; whichever method best suits the facility. Furthermore, the RUG-III case mix system has undergone an extensive battery of tests in various countries and has proven to be a valid tool for assessing the range in resource use found in nursing homes. The results of these studies have appeared in numerous internationally recognised journals since its development in 1988. Based on the findings from this study, the following are recommendations for a funding system using the MDS/RAI and RUG-III case mix system:

- All people who are established as requiring nursing home care should have their RUG-III groups assessed at the time of admission to a home. This process takes an average of 4 – 10 minutes to complete. The data could easily be entered directly into a hand held computer at the time of assessment. Residents would be identified as being in one of two groups: enhanced nursing care needs (clinically complex and above) indicating a greater need for RGN time, or standard nursing care (impaired cognition and below) indicating the need for basic nursing care. The assessment process is straightforward. There is no need for assessors to understand the complexities of the RUG-III case mix system.
- All nursing home residents receive some registered nursing care and should receive an identified level of funding for standard nursing care needs.
- Residents with increased nursing needs (i.e. those in clinically complex and above) should receive enhanced funding to account for the increased RGN time that they receive. These data suggest that this should be 55% more than that for residents with standard nursing care needs
- Residents should be reviewed on repeat assessments as their needs will change over time.
- The levels of funding will be a political decision dependent on the available funds for long-term care.
- The needs of residents receiving rehabilitation or with impaired cognition and perhaps those with very complex technical care requirements (those in the extensive care RUG groups) should be addressed in more detail at a later date.

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## Appendix

### Criteria for allocation to Main Rug III Categories

<b>Rehabilitation</b>	<i>Very High Intensity</i> 450 minutes or more of rehabilitation therapy per week; and at least five days per week of one type of therapy; and at least two types of therapy. <i>High Intensity</i> 300 minutes or more of rehabilitation therapy per week; and at least five days per week of one type of therapy. <i>Medium Intensity</i> 150 minutes or more of rehabilitation therapy per week; and at least five days per week of rehabilitation therapy. <i>Low Intensity</i> 45 minutes or more of rehabilitation therapy per week; at least three days per week of rehabilitation therapy; at least two types of rehabilitation nursing, each provided five days per week
<b>Extensive Services</b>	Physically dependent and very technical care such as: intra-venous feeding, tracheostomy, ventilator/respirator.
<b>Special Care</b>	Physically dependent and complex nursing care needs such as: coma; fever with vomiting; Multiple Sclerosis; pressure ulcers of stage 3 or 4; quadriplegia.
<b>Clinically Complex</b>	Medical conditions and treatments associated with increased nursing needs including: Aphasia, aspiration, dehydration, hemiplegia, terminal illness, chemotherapy.
<b>Impaired Cognition</b>	Intermediate physical dependency and cognitive impairment.
<b>Behavioural Problems</b>	Intermediate physical dependency and daily behavioural problems including; physical abuse, verbal abuse, wandering, hallucinations.
<b>Reduced Physical Function</b>	Residents who do not meet any of the above criteria.