**TAGRA MLC (Morbidity & Life Circumstances) Sub-Group**

**NRAC formula - MLC adjustment:**

**Mental Health and Learning Difficulties care programme**

**Executive Summary**

**Scottish Government (Health Analytical Services Division) and ISD Scotland**

##### December 2012

Executive summary

The NRAC formula is used to allocate funding to the 14 territorial NHS Boards. In 2011/12, the formula was used to allocate £7.6bn out of a total health budget of £11.4bn.

Following the implementation of the formula developed by the NRAC Committee in 2009/10, the Technical Advisory Group on Resource Allocation (TAGRA) has overseen the ongoing maintenance and development of the NRAC formula. In 2010, TAGRA set up 2 technical sub-groups to carry out the detailed analytical work required in 2 key areas of the formula : the Morbidity and Life Circumstances (MLC) adjustment and the issues associated with Remote and Rural areas, in particular in the operation of the Unavoidable Excess Costs adjustment.

The MLC sub-group had been asked to review the morbidity and life circumstances adjustment for the Mental Health & Learning Difficulties (MH&LD) hospital care programme because one of the indicators currently in the formula is no longer available. This report sets out the work of the MLC sub-group and provides findings and recommendations for the Mental Health & Learning Difficulties (MH&LD) hospital care programme.

**The MLC adjustment within the NRAC formula**

The MLC adjustment takes account of additional needs over and above those based on age and sex. Health Boards with areas where residents have greater levels of ill health, or are subject to life circumstances that result in higher levels of ill health, will face increased costs in meeting the increased volume of healthcare activity needed by their populations.

The way the adjustment is calculated is by looking for the factors that best explain the variation in actual costs of healthcare within small areas for each care programme using statistical regression analysis.

Since June 2011, extensive analysis was carried out relating to the MH&LD care programme looking at :-

* Whether an age split into 0-64 year olds and 65 and over is appropriate;
* Investigating the specialty or programme split;
* The most appropriate functional form of the regression analysis;
* The most appropriate indicators to explain need;
* Using 3 year’s aggregated cost data as opposed to one year of data
* The appropriate area base for the analysis (intermediate geographies or datazones)
* Urban rural differences

A number of preliminary conclusions were reached about these issues and reported to TAGRA. However, during this work it became apparent that there was an important issue with a number of ‘outlier’ observations in the data relating to the coding of MH&LD long-stay patients. After further investigation **the sub-group agreed to omit long-stay patients from the analysis and use data on short-stay and outpatients on the incidence of mental health utilisation as a proxy for all mental health treatment**. The key assumption is that relative short-stay plus outpatients utilisation provides a reasonably good representation of the relative need for all mental health utilisation. That is, where total mental health utilisation is high, short-stay and outpatients utilisation will also be high and vice versa.

**Functional Form**

A key issue for decision by the sub-group was the choice of functional form for the regression equations. Considerable initial work was carried out to compare different functional forms. This work uncovered issues around the complexity and feasibility of non-linear approaches. Subsequently, the sub-group reflected on the advantages and disadvantages of the alternative approaches and recommended the use of linear models only for future analysis.

**Therefore, the analysis was taken forward on the basis of a linear approach.**

**Age split**

Examining different models for the under 65s population and 65 and over population was motivated by the expectation that different age groups will have different needs drivers relating to mental health issues. Moreover, an age split would support current policy developments, such as the Change Fund. As indeed confirmed by the following analysis, there are different best performing needs drivers for the younger and older people. Thus, applying different models to these two age groups leads to a better estimate in health care need for the MH&LD hospital care programme. Therefore, the sub-group recommends introducing the proposed age split.

**Key findings, under 65s population**

For the ages under 65 the sub-group recommends a needs index composed of “employment deprivation” (part of the Scottish Index of Multiple Deprivation), “crime deprivation” (part of the Scottish Index of Multiple Deprivation), “hospital admissions due to alcohol use” and “standardised mortality ratios with mental health as cause of death restricted to the under 65s”. Each of the four variables are intuitively related to health in this context and furthermore this needs index was among the best performing. Intermediate geographies with 3 years’ aggregated data were chosen for stability while still retaining reasonable responsiveness. As no strong evidence was found to treat urban and rural areas differently within the model, the sub-group recommends to continue not to include urban rural markers.

The full model details can be found in Chapter 2.

**Key findings, 65 and over population**

The sub-group found that a needs index composed of the “standardised mortality ratio for ages 65 and over” and “hospital admissions due to alcohol” was the most appropriate. This needs index was one of the best performing indices, and there are also theoretical reasons why these two components should be linked to mental health, or more specifically, dementia. Similarly to the under 65s, the model based on 3 years’ data as time span and intermediate geographies as geographical unit is the most stable one, while still maintaining enough responsiveness. Again, no strong evidence was found to treat urban and rural areas differently within the model, and the sub-group recommends not to include urban rural markers.

The full model details can be found in Chapter 2.

**Recommendations for TAGRA**

The sub-group’s recommendations as displayed below improve upon the current formula in several ways. The implementation of an age split between under 65s and 65 and over has allowed different best performing needs indicators to feature across the groups, thus leading to a better estimate in MH&LD healthcare need. The identification and removal of outlier observations has allowed a clearer relationship between a patient’s MH&LD healthcare need and their socio-economic environment. Throughout this investigation, analysis was reviewed against TAGRA’s core criteria (see Chapter 1 for a full list, and the final section of Chapter 2 for an assessment of the models against the core criteria).

**Recommendation 1:** The MLC adjustment should be undertaken separately for the under 65 and the 65 and over age cohorts.

* *Different age groups have different needs drivers , and applying different models to the 2 age groups leads to a better estimate of health care need for the programme as a whole.*

**Recommendation 2:** The Dependent variable for the estimation of the MLC coefficients should be age/sex standardised cost ratios for short-stay (less than half a year) inpatients and outpatients MH&LD hospital activity (for the relevant age cohort).

* *The dependent variable is simply the variable which is to be predicted, which in this case amounts to hospital activity expressed as age/sex standardised cost ratio restricted to the age groups under consideration.*

**Recommendation 3:** The MLC coefficients should be estimated using cost utilisation ratios calculated as an average of the latest 3 years of data.

* *The time span reflects the time period used for the dependent variable in the model.*

**Recommendation 4:** The MLC coefficients should be estimated using Intermediate Geography as the geographical unit.

* *The geographical unit describes the neighbourhoods the model is based on. All the values for the needs index, supply variables and dependent variable are calculated for the chosen neighbourhoods*

**Recommendation 5**: The MLC coefficients should be estimated using linear functional form without transformations.

* *The model is a linear regression model without transformations. This means that a straight line is fitted through the data points, minimising squared distances (errors) between the line and the data points.*

**Recommendation 6**: The needs indicators for the under 65 age cohort should be:

* SIMD (employment);
* SIMD (crime);
* Hospital admissions due to alcohol;
* Standardised Mortality Rations with Mental Health as a cause of death for ages under 65.

**Recommendation 7** The needs indicators for the 65 and over age cohort should be:

* Hospital admissions due to alcohol;
* Standardised Mortality Ratio for ages 65 and over
* *The needs index is the most influential part of the model for resource allocation. The higher the needs index of a given neighbourhood is, the more resources will be allocated to it. The coefficient for the needs index as calculated by the model will determine by how much the health care need is expected to increase if the needs index is increased by one unit.*

**Recommendation 8**: The MLC adjustment updating schedule should take account of the timing of the release of updated data for the dependent variables (e.g. SIMD).

* + *This was considered more important than having a regular time period, e.g. 3 years between updates.*