**TAGRA ACUTE MLC SUBGROUP Tuesday 18th August 2015**

**Revised Potential Candidate Variables Table**

**Background**

At the previous Acute MLC meeting in June 2015, there was some discussion around the potential candidate variables. It was agreed that variables with particular relevance to the elderly population should be sought and added to the list, since the age split analysis had shown the current Acute needs index to be a poorer predictor of additional need for the elderly population. Bruce Guthrie’s work had shown a link between mental health conditions and need for Acute services, so it was felt that some indicators of mental ill health prevalence should also be included. Furthermore, advice was to be sought from an ISD pharmacy advisor on using counts of specific drug types, rather than a total number of types, with a view to better capturing additional need and avoiding rewarding inefficient prescribing.

**1. Morbidity**

**1.1 Prescribing data**

ISD pharmacy advisor Barry Melia provided advice on the questions posed by the Subgroup. In terms of using more specific medications or conditions, he suggested that diabetes medication might be a good indicator, because there would be an increased likelihood of needing Acute services in patients for whom diabetes is medicated. He also suggested using prescriptions for respiratory diseases; a variety of drugs are prescribed for different respiratory conditions, so it would be difficult to isolate particular conditions (e.g. asthma, COPD) through pharmacy data, but a general ‘respiratory’ category could be useful.

In terms of capturing the needs of the elderly population, dementia drugs were suggested as one possibility. Medication for dementia is prescribed near the end of the dementia cycle, when the patient would typically be living in a nursing home. It could be anticipated that the need for Acute services might be greater at that time.

Finally, in terms of using drug counts as a proxy for mental health conditions, this was more difficult as drugs such as antidepressants can be routinely prescribed for other conditions besides mental health. Methadone was raised as a possibility, but it turns out to have a low CHI capture rate and therefore cannot be adequately mapped to data zone geography.

The following data has been obtained as a result of the discussion:

* Number of patients receiving dementia[[1]](#footnote-1) prescriptions
* Number of patients receiving diabetes[[2]](#footnote-2) prescriptions
* Number of patients receiving prescriptions for respiratory[[3]](#footnote-3) conditions

All data are available by postcode for the 2011/12, 2012/13 and 2013/14 financial years.

A potential indicator of need can be constructed by expressing the number of patients as a percentage of the population. The CHI capture rates are higher for the 2013/14 financial year with an increasing trend in the last three years. For this reason it might be worth considering the use of 2013/14 data only. (While a time span of 3 years has been decided upon for the cost ratios, the time span for the needs index will depend upon which variables are chosen.)

**1.2 High Resource Individuals (HRIs)**

High resource individuals are identified in ISD as follows:

1. Calculate the total resource for each individual service user during a financial year.
2. Rank in order of total resource consumption.
3. Identify each of the highest resource users as an HRI until cumulative expenditure reaches 50% of total expenditure.

Counts of HRIs at 2011 Data Zones have been requested from the relevant team for three financial years (2011/12, 2012/13 and 2013/14) in two different age groups: 18-64 and 65 and over.

The number of HRIs as a percentage of each data zone’s population is to be tested as an indicator of need. The year to year variation should be investigated when data are available, to inform a suitable time span for the variable.

**1.3 Did Not Attend (DNA)**

A recent study[[4]](#footnote-4) has shown that the ‘Did Not Attend’ (DNA) rate is highest among those living in more deprived and / or urban areas. It was also found that the patterning of DNA has been relatively stable for the past 10 years.

Counts of DNA outpatient appointments, at 2011 Data Zones, are readily available for three financial years (2011/12, 2012/13 and 2013/14).

The number of DNAs as a percentage of each data zone’s total number of outpatient appointments (or of the DZ population) is to be tested as an indicator of need. The year to year variation should be investigated.

**1.4 Bruce Guthrie’s work**

Bruce Guthrie presented his research work on multimorbidity to the Subgroup in October 2014. He is one of the authors of the paper *“Epidemiology of multimorbidity and implications for health care, research and medical education: a cross-sectional study”* published in 2012*.* The following extract from the paper defines multimorbidity in the context of the analysis; there is no standard definition:

*“We selected 40 such morbidities, which were defined by Read codes (the clinical coding system used in UK general practice to record patient findings and procedures in health-care IT systems) and prescription data. When possible, we based our morbidity definitions on QOF business rules and Read code groups for long-term disorders (as defined by NHS Scotland). When coding definitions were unavailable or did not apply to the available routine data, the clinicians in our team (BG, SM, MN, and GW) agreed new definitions by discussion. The appendix provides further detail of definitions and the 40 morbidities included. As in most other studies, we defined multimorbidity as the presence of two or more of these 40 morbidities in one patient. To specifically examine comorbidity of physical and mental health disorders, we also defined each morbidity as either a physical or mental health disorder.”*

Mental health disorders made up 7 out of the 40 morbidities, and included Depression, Anxiety, Alcohol problems, Dementia, and Schizophrenia.

QOF register sizes data are currently available for the 2013/14 financial year. The data are available at GP practice level, in the form of numbers of registered patients with particular conditions. However, there is no way to get these numbers by Data Zone without the postcodes of the patients in each register. The General Medical Services team at ISD have advised that the new SPIRE dataset will make patient level data available, but this will not be available until around April 2016. According to the Review’s current work plan, the regressions on potential indicators should be completed by February 2016.

However, an alternative mental health-related variable could be derived from census data, as detailed in section 2.5 below.

**2. Census data**

**2.1 Ethnicity – question 15**

Question 15 from the census asks about ethnicity. There are 6 categories: *White, Mixed, Asian, African, Caribbean,* and *Other.* Data from this question have been obtained from Census 2011, by 2011 Data Zone. A percentage of non-white residents in each DZ can be calculated and used as a potential indicator of need. (Each minority ethnic group could be used for the calculation of a rate separately but this would result in many zeros.) Furthermore, the data is available by age and sex, so an age-sex adjusted rate could be calculated if this is considered useful.

**The recommended variable is the percentage of non-white residents within each DZ.**

**2.2 Health conditions – question 20**

Question 20 asks, *“Do you have any of the following conditions which have lasted, or are expected to last, at least 12 months?”* with options:

* *Deafness or partial hearing loss*
* *Blindness or partial sight loss*
* *Learning disability*
* *Learning difficulty*
* *Development disorder*
* *Physical disability*
* *Mental health condition*
* *Long-term illness, disease or condition*
* *Other condition*
* *No condition*

Data have been obtained, by 2011 Data Zone. The number of people self-reporting any of the above conditions can be expressed as a percentage of the population. The *Long-term illness, disease or condition* response option has been identified as a candidate indicator of need for Acute services.

**2.3 Limiting long-term illness (LLTI) – question 21**

Question 21 asks, *“Are your day-to-day activities limited because of a health problem or disability which has lasted, or is expected to last, at least 12 months?”* with options:

* Yes, limited a lot
* Yes, limited a little
* No

Data have been obtained, by 2011 Data Zone. These data are used for developing one of the current indicators of need – the LLTI Ratio.

**2.4 Unemployment/Permanent sick**

Data has been obtained from questions 24-28. The data from this linked series of questions identifies numbers of people who are not working and permanently sick. The percentage of unemployed and permanent sick residents of each DZ can be used as potential indicators of need.

**2.5 New suggestions for discussion at Subgroup meeting**

* **Unpaid care – question 9** *“Do you look after, or give any help or support to family members, friends, neighbours or others because of either: long-term physical/mental ill-health/disability; or problems related to old age?”* with response options *No* and *Yes* with a variety of numbers of hours per week in the Yes case. This could be used to test whether unpaid caregiving predicts need for Acute services.
* **General health – question 19** “*How is your health in general?*” with response options *Very good*, *Good*, *Fair*, *Bad*, or *Very bad*. This has been mentioned in previous iterations of the potential candidate variables paper, but not included in the table.
* **Mental health condition – question 20** *“Do you have any of the following conditions which have lasted, or are expected to last, at least 12 months?”* with *Mental health condition* as one response option. The data has already been obtained for this question, but this particular response has not been considered for use before now. It could be useful to try to capture the link reported by Bruce Guthrie between mental health conditions and need for Acute services.
* **Education level – question 23** “*Which of these qualifications do you have?*” with a list of response options. This could be included in the absence of SIMD to test whether education level predicts need for Acute services.
* **Job seekers – question 25** *“Were you actively looking for any kind of paid work during the last 4 weeks?”* with response options *Yes* or *No*. The data that has already been obtained from questions 24-28 identifies numbers of people who are unemployed but “economically active” i.e. seeking work. This would be a completely different set of people from those identified as permanently sick, and could be used to check whether high levels of unemployment correlate with need for Acute services.

**3. Supply variables calculation**

All supply measures are based on contemporaneous supply and are mostly computed as the volume of the service provider (number of GPs in a practice, or episodes at a hospital) divided by some distance decay function, and summed over all Scottish providers. All supply variables are defined in Annex D of Technical Report D. (See the Annex for the exact formulation of these variables.)

**Supply of/access to General Practice**

1. *“Number of GPs serving each Data Zone”.* This variable is the sum of the number of practices serving each DZ weighted by the whole time equivalent number of GPs in each practice.
2. *“GP supply, 1km intrazonal cost”, “GP supply, 5km intrazonal cost” and “GP supply, 10km intrazonal cost”.* A function of the linear distance from the population grid centroid of the DZ to each surgery it is served by. The intrazonal cost refers to the assumed travel within the small area, in addition to the distance from its centroid to the practice.

**Hospital supply**

1. *“Inpatient/Outpatient Access – nearest facility”.* Size of the nearest inpatient/outpatient facility, where size is measured as the number of inpatient or outpatient episodes in the last year. Nearest here means closest to the DZ population centroid. This measure was not recommended in Technical Report D since it tends to be biased by institutions with very small capacity.
2. *“IPACX/OPACX”.* A function of the linear distance from the population grid centroid of the DZ to each inpatient (I) or outpatient (O) facility it is served by.
3. *“IPAC/OPAC”.* Similar to the above, but with an attempt at a correction for the size of the population served by each facility. It is stated in Technical Report D that:

*“Though intuitively attractive, this method appears to overcompensate for population effects – especially in the Western Isles and Shetland. Although the hospitals are relatively small, the numbers in the catchment populations are also small, leading to values for (population corrected supply) that exceed those in central Glasgow. Because of our concern at the scale of the attraction constrained correction, only the two uncorrected measures (OPACX and IPACX) were used in the index development.”*

**The subgroup is asked to consider excluding the potential hospital supply variables given in items 3 and 5 above.**

*Table 1. Potential candidate variables*

|  |  |  |
| --- | --- | --- |
| **Indicator** | **Availability** | **Data Source** |
| ***Morbidity:*** |  |  |
| Low birth weight births | After August 2015 | ISD |
| Death rate 0-74 | After August 2015 | ISD |
| Death rate 0-74 Cancer  | After August 2015 | ISD |
| Death rate 0-74 CHD | After August 2015 | ISD |
| Death rate 0-74 stroke | After August 2015 | ISD |
| All cause SMR 0-64 | After August 2015 | ISD |
| All cause SMR 0-69 | After August 2015 | ISD |
| All cause SMR 0-74 | After August 2015 | ISD |
| Cancer SMR 0-64 | After August 2015 | ISD |
| Cancer SMR 0-69 | After August 2015 | ISD |
| Cancer SMR 0-74 | After August 2015 | ISD |
| Heart Disease SMR 0-64 | After August 2015 | ISD |
| Heart Disease SMR 0-69 | After August 2015 | ISD |
| Heart Disease SMR 0-74 | After August 2015 | ISD |
| Respiratory SMR 0-64 | After August 2015 | ISD |
| Respiratory SMR 0-69 | After August 2015 | ISD |
| Respiratory SMR 0-74 | After August 2015 | ISD |
| Digestive System SMR 0-64 | After August 2015 | ISD |
| Digestive System SMR 0-69 | After August 2015 | ISD |
| Digestive System SMR 0-74 | After August 2015 | ISD |
| Poison & Injury SMR 0-64 | After August 2015 | ISD |
| Poison & Injury SMR 0-69 | After August 2015 | ISD |
| Poison & Injury SMR 0-74 | After August 2015 | ISD |
| Other SMR 0-64 | After August 2015 | ISD |
| Other SMR 0-69 | After August 2015 | ISD |
| Other SMR 0-74 | After August 2015 | ISD |
| Outpatient SMR 0-64 | After August 2015 | ISD |
| Outpatient SMR 0-69 | After August 2015 | ISD |
| Outpatient SMR 0-74 | After August 2015 | ISD |
| High Resource Individual counts | After August 2015 | ISD |
| Did Not Attend counts | After August 2015 | ISD |
| Diabetes patients (prescribing data) | After August 2015 | ISD |
| Dementia patients (prescribing data) | After August 2015 | ISD |
| Respiratory patients (prescribing data) | After August 2015 | ISD |
| Respondent long-term illness (Census 2011 question 20) | After August 2015 | Census |
| Limited activity (LLTI) (Census 2011 question 21) | After August 2015 | Census |
| Unemployed permanent sick (Census 2011 questions 24-28) | After August 2015 | Census |
| ***Ethnicity:*** |  |  |
| Non-white populations(Census 2011 question 15) | After August 2015 | Census |
| ***Supply Variables:*** |  |  |
| Number of GPs serving each Data Zone | Can be recalculated now | ISD |
| GP supply, 1km intrazonal cost | Can be recalculated now | ISD |
| GP supply, 5km intrazonal cost | Can be recalculated now | ISD |
| GP supply, 10km intrazonal cost | Can be recalculated now | ISD |
| IPAC  | After August 2015 | ISD |
| IPACX  | Can be recalculated now | ISD |
| OPAC  | After August 2015 | ISD |
| OPACX  | Can be recalculated now | ISD |
| Inpatient Access – nearest facility | Can be recalculated now | ISD |
| Outpatient Access – nearest facility | Can be recalculated now | ISD |
| ***Health Board Dummy Variables*** |  |  |

**Annex: Supply variables calculation**

This is a repeat of section 3, with more detail on the formulation of the supply variables.

**Supply of/access to General Practice**

1. *“Number of GPs serving each Data Zone”.* This variable is the sum of the number of practices serving each DZ weighted by the whole time equivalent number of GPs in each practice.
2. *“GP supply, 1km intrazonal cost”, “GP supply, 5km intrazonal cost” and “GP supply, 10km intrazonal cost”.* A function of the linear distance from the population grid centroid of the DZ to each surgery it is served by. The intrazonal cost refers to the assumed travel within the small area, in addition to the distance from its centroid to the practice. This can be expressed algebraically as:

$$GP supply n km= \sum\_{all practices in the DZ}^{}\frac{number of WTE GPs per practice}{\left(distance to practice+n\right)^{2}}$$

where *n* is 1, 5 or 10 kilometres, i.e. different buffer distances.

**Hospital supply**

1. *“Inpatient/Outpatient Access – nearest facility”.* Size of the nearest inpatient/outpatient facility, where size is measured as the number of inpatient or outpatient episodes in the last year. Nearest here means closest to the DZ population centroid. This measure was not recommended in Technical Report D since it tends to be biased by institutions with very small capacity.
2. *“IPACX/OPACX”.* A function of the linear distance from the population grid centroid of the DZ to each inpatient (I) or outpatient (O) facility it is served by. This can be expressed algebraically as:

$$IPACX/OPACX= \sum\_{all facilities in the DZ}^{}\frac{number of episodes per facility}{\left(distance to facility+10\right)^{2}}$$

1. *“IPAC/OPAC”.* The same inverse decay function is used as for IPAXC and OPACX, but the volume of each hospital is “attraction constrained”: the number of episodes at each hospital is weighted according to the size of the population it serves. This is the number of people in each DZ, weighted by the inverse square of the distance from the DZ centroid:

$$IPAC/OPAC = \sum\_{all facilities in the DZ}^{}\frac{{number of episodes per facility}/{\left(\frac{DZ population}{distance to facility^{2}}\right)}}{\left(distance to facility+10\right)^{2}}$$

It is stated in Technical Report D that:

*“Though intuitively attractive, this method appears to overcompensate for population effects – especially in the Western Isles and Shetland. Although the hospitals are relatively small, the numbers in the catchment populations are also small, leading to values for (population corrected supply) that exceed those in central Glasgow. Because of our concern at the scale of the attraction constrained correction, only the two uncorrected measures (OPACX and IPACX) were used in the index development.”*

1. Includes all drugs in BNF section 4.11 [↑](#footnote-ref-1)
2. Includes all insulin and antidiabetic drugs [↑](#footnote-ref-2)
3. includes all lama, laba and high strength steroid inhalers [↑](#footnote-ref-3)
4. *Who is least likely to attend? An analysis of outpatient appointment ‘Did Not Attend’ (DNA) data in Scotland.* March 2015. NHS Health Scotland [↑](#footnote-ref-4)