



AMHOCN

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'Sharing Information to Improve Outcomes'

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Case complexity adjustment and Mental health outcomes: Conceptual issues

Philip Burgess and Jane Pirkis

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Setting the context

Australia has taken a co-ordinated national approach to outcome measurement in mental health services which has few international precedents of a similar scale (Pirkis et al., 2005). A range of clinician-rated and consumer-rated outcome instruments are routinely administered in public sector mental health services, under the Mental Health National Outcomes and Casemix Collection (MH-NOCC) protocol. The MH-NOCC protocol requires individual providers to administer the clinician-rated outcome measures (and offer consumers the consumer-rated measures) during given 'episodes of care', at particular 'collection occasions'. An episode is defined as '... a more or less continuous period of contact between a consumer and a mental health service organisation that occurs within the one mental health service setting [e.g., inpatient or community]' (Department of Health and Ageing, 2003). Collection occasions occur at set points and for different reasons: admission (new referral; transfer from other setting; other), at review (91 days; other), and at discharge (no further care; change of setting; death; other). The data are collated at a mental health service organisation level, and then at a state/territory level. States/territories submit de-identified, unit record level data to the Australian Mental Health Outcomes and Classification Network (AMHOCN) which processes, analyses and reports upon it on behalf of the Commonwealth Government.

This approach to outcome measurement has yielded a substantial volume of valuable data on mental health outcomes. AMHOCN has analysed and reported on these data via a range of paper-based and electronic reports. A limitation in this enterprise has been that outcomes have been considered for a given collection age group (i.e., adults, children and adolescents, and older people) within a particular mental health service setting (i.e., inpatient, ambulatory, community residential), but it has not been possible to date to guarantee like-with-like comparisons. The next step is to 'level the playing field' in some way, to disentangle the reasons for differences in the level of outcome achieved by different services or groups of services. Service A might achieve better outcomes than Service B because it is providing more optimal care to a similar group of consumers, or because it is providing the same quality care to a group of consumers with less complex needs. The remainder of this paper discusses some of the conceptual and practical considerations required to further the case complexity adjustment agenda^a.

^a Taking into account this case complexity in analysing outcomes is referred to variously as either, 'casemix adjustment', 'risk adjustment' or, occasionally 'severity adjustment'. Whereas the principles are common, the terms 'casemix' and 'risk' adjustment often connote funding and payment issues. The term 'case complexity adjustment' is preferred since it is neutral with respect to funding and payment issues although it is recognised that much of the published literature uses the terms 'casemix adjustment' or 'risk adjustment'.

Background to risk adjustment

Risk adjustment has been defined as *'a means of statistically controlling for group differences when comparing non-equivalent groups on outcomes of interest'* (Hendryx, Beigel, & Doucette, 2001). In the Australian mental health setting, the groups are consumers within particular collection age groups and mental health service settings. They are non-equivalent in the sense that they may have unequal opportunities for particular levels of outcome for reasons that are beyond the control of the service providing their care. For example, adult consumers who are admitted to an acute inpatient setting may have different opportunities for reductions in their symptoms and improvements in their levels of functioning, depending on the severity of their presentation.

Risk adjustment efforts in mental health have lagged behind those in the general health sector, but have taken a similar approach. Hermann et al (2007) provide an excellent review of work in this area, using a broad definition of outcomes which includes not only clinical outcomes, but also outcomes related to service utilisation and costs. Indeed, they note that the majority of effort in risk adjustment has been put into examining predictors of service utilisation and cost, via casemix studies designed to identify 'iso-resource' groupings (groups of consumers with similar characteristics who have similar levels of service use and/or incur similar costs). Less emphasis has been given to risk adjustment in the context of clinical outcomes. Studies that consider service utilisation and costs tend to be designed to inform payment debates. Some studies of outcomes also have this aim, but others are intended to inform a quality agenda. This latter agenda has divorced outcomes from issues of funding, and has instead considered whether services might learn lessons from each other in terms of how best to deliver care to maximise outcomes.

Clinical outcomes (as opposed to outcomes related to service utilisation and costs) are the subject of the current paper.

Selection of risk and outcome variables

Risk adjustment requires careful consideration of both the risks to be adjusted (i.e., the risk variables) and the outcomes to be assessed (i.e., the outcome variables). Hendryx et al (2001) provide a useful set of criteria, adapted below, for the selection of each.

They suggest that risk variables should:

- *Be non-treatment/service measures of the consumer:* Factors like age, sex or diagnosis would satisfy this criterion because they are intrinsic to the consumer. Factors like length of stay, which are related to service delivery, would not.
- *Be valid and reliable and not susceptible to 'gaming' by providers or services:* Variables that can be objectively verified in some way may be the most relevant here.
- *Be significantly related to the outcome, both in theory and in practice:* If level of suicidality was the outcome, for example, marital status might be considered as a potential risk variable because being single (at least for males) has been shown to be predictive of both completed and attempted suicide, and various plausible theoretical explanations have been posited for this (e.g., loneliness, lack of support, lack of dependents).
- *Discriminate among consumer groups and across services:* If the distribution of a given variable is similar across groups, it will be unlikely to be useful as a risk variable because all groups will face the same risk.
- *Make a difference:* The selected variables must alter the conclusions that would have been drawn about the respective outcomes for given groups of consumers within and across services had the risk adjustment not occurred.

They suggest that outcome variables should:

- *Be valid and reliable and not susceptible to 'gaming' by providers or services:* Again, variables that can be objectively verified in some way may be the most relevant here.
- *Be within the control of providers or services to influence, without intervening variables:* Variables related to level of functioning and severity of symptoms are good examples here, because they are the kinds of areas that are typically addressed through treatment. Other variables, such as quality of life, may be more difficult for providers or services to alter because of the multitude of external competing influences.
- *Be substantial:* Outcome variables must be of significance to consumers, carers, providers, and service managers and funders.

Data analysis

Hermann et al (2007) and Hendryx et al (2001) both discuss the analytic approaches that can be used in risk adjustment.

Hermann et al (2007) classify the statistical methods into two – stratification and multivariate regression analyses:

- *Stratification* involves splitting the sample into groups with common presentations of the given risk variable(s), in order to allow the given outcome variable to be assessed within more homogeneous groups. Stratification becomes unwieldy when too many risk variables are being considered.
- *Multivariate regression analysis* may be more appropriate when a number of risk variables are being examined. It involves a statistical assessment of the extent to which given risk variables are associated with the outcome variable, and allows all other variables to be held constant when any one variable is being considered.

Hendryx et al (2001) provide a more refined classification of the types of analytic approaches that can be used in risk adjustment. They discuss four different types of methods – baseline-post-test, direct weighting, regression models, and classification and regression trees, growth curves and other advanced models:

- *Baseline-post-test* is the simplest model, and involves simply measuring an outcome at baseline and measuring the same outcome following an episode of care. The advantage of this is that the best predictor of an outcome is often performance on the same variable at an earlier point in time, but generally more complex analytical approaches are preferred because they take into account a broader range of variables.
- *Direct weighting* involves weighting an outcome indicator by risk variables so that the contribution of a risk variable for a given group matches the distribution of that variable over the entire multi-group population. For example, if age is a risk variable and age profiles differ across services, outcome scores would be calculated separately for different age groups, weighted by the proportion of the population accounted for by that age group, and then summed. Again, this is a relatively simple approach which reaches a natural limit when a number of risk variables are considered.
- *Regression models* involve the approach indicated by Hermann et al (2007), above.

- *Classification and regression trees, growth curves and other advanced models* extend the regression models described above. The classification and regression tree approach, for example, builds regression models in an iterative fashion and focuses on interactions among possible risk variables. This has the advantage of ensuring nuances of risk prediction beyond simple main effects, but is computationally complex and sometimes more likely to yield findings that may not be clinically meaningful.

The proposed approach

The proposed approach will involve examining how best to risk adjust for outcomes in the MH-NOCC dataset. Outcomes will comprise change scores on the Health of the Nation Outcome Scales (HoNOS) family of measures, as assessed at the beginning and end of an episode (noting that the beginning and end will not always be an admission and discharge, but, in the case of ongoing episodes, might also be an admission and review, a review and review, and a review and discharge).

The approach to the risk adjustment of these outcomes will be iterative, and will begin with an exploratory analysis of the extent to which pre-defined groupings of consumers can be differentiated on the basis of their outcomes. The pre-defined groupings will come from the Mental Health Classification and Service Costs (MH-CASC) Project, which was conducted in 1996 and drew on data from 22 mental health care organisations across Australia (Buckingham, Burgess, Solomon, Pirkis, & Eagar, 1998a, 1998b; Burgess, Pirkis, Buckingham, Eagar, & Solomon, 1999). The MH-CASC project aimed to determine whether consumer factors predicted mental health service costs, and ultimately identified an underlying classification which comprised 42 consumer classes (23 for inpatient episodes and 19 for ambulatory episodes) which accounted for 78% of the variance in total episode costs. The variables defining these 42 classes have formed the basis of the MH-NOCC dataset, and the 'grouper' is readily available. This approach mirrors that taken in a similar New Zealand project, the New Zealand Mental Health Classification and Outcomes Study (NZ-CAOS) (Eagar et al., 2004; Gaines, 2003; Trauer & Eagar, 2004).

Despite this clearly being a sensible starting point, it is unlikely that the MH-CASC classification will yield optimal results. Although the MH-CASC classes have been shown to explain significant proportions of variations in costs, and there might be expected to be a relationship between costs and outcomes, it is likely that an alternative classification system would predict outcomes with greater precision. For this reason, further analyses using multivariate regression models and classification and regression tree approaches will explore whether alternative combinations of

variables are more appropriate for risk adjustment. Particular attention will be given to indicators of severity at baseline – e.g., scores on the HoNOS family of measures at the beginning of an episode.

It is worth making a final comment here about the services that form the unit of comparison. As noted, risk adjustment controls for consumer-related differences which have an impact on outcomes. In doing so, it enables firmer conclusions to be drawn about any observed differences in outcomes at the service level being due to differences in the way in which services deliver care. There is still an argument, however, that even after controlling for consumer differences there is a need to make sure that services that are being compared are performing similar functions (i.e., that comparisons are being made between peer groups of services). To date, analyses performed by AMHOCN have grouped services at a fairly high level of aggregation, based on mental health service setting and age grouping. Further work is currently being undertaken to develop more refined groupings of peer services, and this will continue alongside the above risk adjustment efforts.

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