Performance of Public and Private Hospital Systems:
The case for Risk Adjustment and exploring reasons for differential performance
Submission to the Productivity Commission

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1. BACKGROUND

1.1 Rationale for Productivity Commission's study

The Australian Productivity Commission prepared an Issues Paper entitled "Performance of Public and Private Hospital Systems" during June 2009 and invited submissions on the proposed *Hospital Performance Study* by 27 July, 2009. The Commission will report back within 6 months of receipt of the Terms of Reference. The key context for the study is the Government's commitment to improving transparency, accountability and performance reporting within the health system. This is reflected in the new National Healthcare Agreement (NHC) and in COAG's agreement to introduce a nationally consistent approach to activity based funding (ABF) in public hospitals, It is also reflected by the Government's commitment to move towards a nationally consistent performance reporting for public and private hospitals (Productivity Commission, 2009). The following submission will focus upon some components of the Productivity Commission's Terms of Reference, viz (a), (d) and (e) which will consider:

a) Comparative hospital and medical costs for clinically similar procedures performed by public and private hospitals, using baseline data to be provided by states and territories under the new NHC, and existing data provided to the Government by private hospitals. The analysis is to take account the costs of capital, FBT exemptions and other relevant factors.

d) Other relevant performance indicators, including the ability of such indicators to inform comparisons of hospital performance and efficiency.

e) If any of the foregoing tasks prove not fully possible because of conceptual problems and data limitations, the Commission should propose developments that would improve the feasibility of future comparisons (Productivity Commission, 2009).

1.2 Submission context

Some proposed reforms for the National Health Care Agreement (NHC) were forwarded to all State Premiers, Territory Chief Ministers, Federal and State Health Ministers, Treasurers, the Federal Department of Prime Minister and Cabinet and the Federal Minister for Finance and Deregulation prior to the November 2008 COAG meeting (Antioch, 2008). A subsequent paper was also forwarded to these stakeholders given the decisions made at the November 2008 COAG meeting and the opportunities for reform in the Federal and State government budgets (Antioch, 2009). Both papers included feedback on the reforms from national and international stakeholders over the period 2006 to 2008.

The reforms addressed issues, inter alia, relating to the *risk adjustment of hospital costs and funding* in Australia. In response to the paper prepared prior to the November 2008 COAG meeting, the Northern Territory Health Minister wrote to Dr Antioch indicating an interest in the use of risk adjustment across Australia in the context of the implementation of Activity Based Funding. He states: "*..a major feature of the National Partnership Agreement on Hospital and Health Workforce Reform (agreed in December 2008) is the introduction of Activity Based Funding (ABF) as set out in Schedule A to that Agreement. I am interested in the way in which the risk adjustment work you have undertaken may be used in the context of the work that needs to be done on ABF implementation across Australia'*. This important feedback was included as an attachment to the May 2009 paper forwarded to stakeholders by Dr Antioch (Antioch, 2009).

Following approval by the Federal Department of Prime Minister and Cabinet and NT Health Minister, both submissions were forwarded to the National Health and Hospitals Reform Commission (NHHRC) during June 2009 and included on the Reform Commission's website. Weblinks to both submissions are included below [1]

The concept of risk adjustment in *assessing hospital costs* and potentially, related funding issues is considered central to addressing the above Terms of Reference of the Productivity Commission's study and the recommendations in this submission are based on extensive work undertaken in Victoria in the context of reforms of casemix funding, along with feedback relating to the papers by Antioch (2008, 2009).

My submission to the Productivity Commission involves three key contributions. This includes this overview document which is provided along with the two journal articles published in the *European Journal of Health Economics.* The two journal articles and an erratum are provided as the key attachments to this document and relate to the Victorian work on risk adjustment reforms of casemix funding (Antioch and Walsh, 2004a, 2004b; Antioch, Ellis and Gillett, et al 2007). It is intended that the submissions provided to the NHHRC by Antioch (2008, 2009) [1] relating to the NHA reforms will also be considered by the Productivity Commission along with this submission and its two attachments.

2. ISSUES

2.1 PARTIAL INDICATORS OF PERFORMANCE

2.1.1 Cost indicators

Cost indicators discussed on Page 10 of the Commissions paper will be briefly addressed below. Full details of the rationale, research and policy findings are included in the attachments to this overview.

(a) Cost measures

The cost measures could be more precisely defined. For example '*average cost per separation, when comparing costs associated with clinically similar procedures'* (at page 10) could be more precisely defined as 'average cost per separation by AR-DRG'.

(b) Other cost measures, factors and associated methodology

Risk adjustment analyses for specified AR-DRGs are considered desirable, especially if a broader selection of AR-DRGs are chosen for the Commission's analysis. Victorian hospital cost analyses published from 2000 to 2007 has successfully applied risk adjustment methodologies when comparing DRG costs between hospitals (See Antioch and Walsh, 2004a, 2002, 2000 and Antioch, Ellis and Gillett et al 2007).

Risk adjustment analyses of hospital costs was used to successfully negotiate on hospital funding issues by Bayside Health and was used by the Victorian Government to improve casemix funding policy. Details on the hospital studies for consideration by the Productivity Commission are attached in Antioch and Walsh (2004a, 2004b) (See Attachment 1). The reforms implemented and also considered by the Victorian government in the context of the work of the Victorian government's Risk Adjustment Working Group (RAWG) chaired by Dr Kathryn Antioch are shown in Antioch, Ellis and Gillett (2007) (See Attachment 2) The latter study includes important results of the application of risk adjustment of hospital costs State-wide across the Victorian hospitals

[1] http://www.nhhrc.org.au/internet/nhhrc/publishing.nsf/Content/297-interim

for 70 AR-DRGs and may be instructive for the Productivity Commission's study. Antioch et al (2007) also discusses the risk adjustment of the complexity component of the Training and Development Grant, which is an important feature of casemix funding arrangements in Victoria.

The risk adjustment reforms enable greater equity in health financing since risk adjustment is required for AR-DRGs that may be underfunded since they can be related to State-wide referral services such as trauma, heart transplants, lung transplants and Cystic Fibrosis in hospital networks, where the averaging process in the cost weight process State-wide, does not adequately capture the differences in casemix of such DRGs (Antioch and Walsh, 2004a, Antioch 2009). Risk adjustment also offers the opportunity to align indigenous and other socio-economic disadvantage and related health need to appropriate funding levels (Van de Ven and Ellis 2000).

Additionally, the Evidence Based Medicine reforms included in Antioch (2008, 2009) involving translating economic and clinical evidence into clinical practice enabled greater cost-effectiveness at the point of care at Bayside Health and Western Health. Improved health outcomes are enabled through more cost-effective use of the available funds. A detailed discussion of these mechanisms for greater cost-effectiveness are beyond the scope of this submission to the Productivity Commission but might be considered should the Commission be interested in analysing why differences occur in hospitals in efficiency and health outcomes across hospitals. That would be an important consideration, perhaps in later analyses.

2.1.2 Clinically similar procedures

(a) Choice of 20 AR-DRGs by AIHW

It is not clear why such as small selection of AR-DRGs has been chosen for the study. There are several DRGs that may be of interest in addition to those shown in Table 4 in the Commission's Issues Paper. The rationale given is that they 'relatively homogeneous' with differences in performance more likely attributable to hospital performance rather than patient differences. However, if there are several more complex AR-DRGs in need of risk adjustment that may be undertaken in both public and private hospitals, then these could also be included.

The study by Antioch, Ellis and Gillett et al (2007) provides details for 70 AR-DRGs that have been analysed across Victoria's hospital data and which were associated with key funding challenges (deficits) across the hospitals. The multiple regression results for AR-DRG costs in Tables 2 and 3 of Antioch et al (2007) relate to the AR-DRGs where hospitals believed there was a need for risk adjustment, given the link to state-wide referral services and major DRG budgetary deficit issues following analyses of revenue and costs.

Such results may be of interest in the broader context of the national implementation of Activity Based Funding (ABF). It may also assist the Productivity Commission in its current study. By limiting the analysis to only the selected 20 AR-DRGs, there may be some bias in the study. It may limit the robustness and generalisability of the results and perhaps will not really adequately compare the performance of both public and private hospitals. *Hospital performance between hospital types and in the context of national implementation of ABF, perhaps requires a broader selection of AR-DRGs for analysis to adequately address the problems of severity and disadvantage that can impact DRG funding and related cost comparisons.* These are considered to be major issues in need of resolution.

(b) Other factors to be considered in compiling the list of 'procedures' for comparisons

Studies by Antioch and Walsh (2000, 2002, 2004a 2004b) and Antioch et al (2007) provide evidence of the need to risk adjust DRGs in Australia and elsewhere[2]. Details of the some of the risk adjustment variables used in Bayside Health's analyses are shown in the above mentioned publications by Antioch and Walsh. These included specifications of various variables, including *severity markers* that clinical leaders identified as being related to the State wide referral services for specific DRGs.

Importantly, the analyses across the major teaching hospitals in Victoria by Antioch et al (2007) provides the risk adjustment independent variables that were applied to the state wide data using multiple regression

[2] The development of risk adjustment solutions to the budgetary challenges facing the Victorian government and hospitals for casemix funding was facilitated by insights on the methodologies of DRG development undertaken previously by the Federal government. eg Antioch and Zhang (2000) and Antioch, Zhang and Raw (1998) and by Victorian government studies on cost drivers for state-wide hospital budgets in negotiations with the Victorian Treasury eg see Antioch, Walsh, Anderson and Brice (1999).

techniques. The co-efficients for the variables are presented, which can also be interpreted as payment rates for funding models. Tables 2 and 3 in Antioch et al (2007) show the following key independent variables for risk adjustment across 70 AR-DRGs: Age, sex, number of body systems, emergency department admission, patient transferred in, high length of stay outlier, and 'severity marker'.

The specific severity markers for each DRG may be available from the Victorian Department of Human Services on request should the Productivity Commission be interested to obtain such data. Further, Table 4 (page 12) in the Commission's paper includes two DRGs which were actually included in the Victorian data analyses and may require further risk adjustment to enable valid comparisons between hospitals.

Risk adjustment analyses can provide valuable insights into cost drivers within a AR-DRG. This can enable greater understanding of the reasons for cost differences and thereby assist in analysing relative efficiency.

The significant risk adjustment independent variables for these two DRGs may be of interest. These include AR-DRG G07B (Appendectomy W/O Catastrophic or Severe CC) and DRG R61B (Lymphoma and Non-Acute Leukaemia W/O Catastrophic CC). *The significant independent risk adjustment variables shown in table 2 (Antioch et al, 2007 page 205) for these DRGs are as follows*. It should be noted that the analyses in Table 2 includes analyses for all of the 23 Victorian hospitals (including some rural hospitals):

- *AR-DRG G07B (Appendectomy W/O Catastrophic or Severe CC):* Intercept, Age, Sex, Number of Body Systems, emergency department admission, high LOS outlier.

- *DRG R61B (Lymphoma and Non-Acute Leukaemia W/O Catastrophic CC:* Intercept, Age, Number of Body Systems, patients transferred in; high LOS outlier (Antioch et al, 2007).

Analyses shown in Table 3 include only data for the Risk Adjustment Working Group (RAWG) hospitals, which included only the major Victorian teaching hospitals. The significant independent risk adjustment variables for these DRGs are as follows:

- *AR-DRG G07B (Appendectomy W/O Catastrophic or Severe CC):* Intercept, Number of Body Systems, emergency department admission, high LOS outlier.

- *DRG R61B (Lymphoma and Non-Acute Leukaemia W/O Catastrophic CC:* Intercept, Age, sex, Number of Body Systems, patients transferred in; high LOS outlier (Antioch et al, 2007).

Note that the significant independent variables for both DRGs does vary depending on the hospital data included (ie whether only major teaching hospitals are included vis a vis a much broader selection of hospitals including some rural hospitals).

2.1.3 Data sources

Page 13 of the Commission's Issues paper addresses issues around comparisons between public and private hospitals and costs. For additional insights on other data sources see comments in the preceding sections.

(a) Commission's proposed dissagregations by jurisdiction, region and peer group

Further consideration of these matters could be undertaken in consultation with the Health Round Table (HRT). This is a consortium of public hospitals in Australian and New Zealand, which provides an excellent array of performance indicators and peer group classifications and comparisons. Antioch and Walsh (2000, 2002, 2004(a)) used comparative data from the HRT extensively in the analyses of efficiency and casemix complexity arguments. See Attachment 1 to this submission (Antioch and Walsh 2004a) for further details of the HRT and how the data was applied. The type of data and the basis of peer group comparison may be of interest the Productivity Commission from the perspective of the dissagregations, performance indicators, data selection and related analyses. Further details are available from Dr David Dean, Executive Director of the HRT.

2.1.4 Summing up

(a) Proposed indicators in Table 6 of the Commission's issues paper

The foregoing has indicated the need for inclusion of explicit consideration of *risk adjustment* in analyses of efficiency. Whilst some brief consideration of risk adjustment is later included in Commission's discussions in the context of multivariate analysis, perhaps analyses of specific AR-DRGs could be facilitated by using multiple regression techniques in the methodologies by Antioch, Ellis and Gillett (2007) which was based on the foundation methodology developed by Antioch and Walsh (2004a, 2002, 2000). Perhaps an additional efficiency indicator could be considered as follows: ***'Risk adjusted costs** for selected AR-DRGs'*. Clearly, the need for such analyses would depend on the final list of AR-DRGs included in the Productivity Commission's analyses.

Of the 20 AR-DRGs shown in Table 4 (Productivity Commission, 2009), two have already been identified in Victorian analyses as being in need of risk adjustment, as outlined above. There may be scope for showing the co-efficients for significant independent variables by some AR-DRGs in some risk adjustment analyses by hospital type. This might assist in exploring the *reasons* for differences in the average costs between public and private hospitals. For example, are issues such as 'transferred in from another hospital' 'emergency department admission' or 'severity markers' (such as identified diagnostic or procedure codes) demonstrated to be higher cost drivers by hospital type in econometric analyses?

The rationale for risk adjustment of private hospital costs in addition to that of public hospitals may also lie in arguments relating to relative complexity of casemix associated with *State-wide referral services*. For example, Cabrini Health, a very large network of private hospital facilities and community services in Victoria has a very large geographical referral service for cancer treatment. Such treatment may be associated with relatively higher casemix complexity, which may impact on cost differences for some DRGs relative to other types of hospitals. The relative challenges also presented by differences in socio-economic status and disadvantage in light of demographics and geography as emphasised by Vatskalis (2009)[3], the NT Health Minister, could also be explored using risk adjustment.

2.2 MULTIVARIATE ANALYSIS

The two types of multivariate frontier techniques (stochastic frontier analysis and data envelope analysis) intended to be undertaken by the Commission are very helpful techniques. Perhaps the Commission may have some interest in also considering the approach used in the multiple regression techniques used in the Victorian analyses attached to this paper. The Commission could also consider how such data were used with *additional* performance indicator and benchmarking data to identify efficiencies in light of casemix complexity. In this regard, the original work of Antioch and Walsh (2002a, 2000 and 2004) will be of significant interest given the extensive use of the HRT data for measures of efficiency in addition to risk adjustment analyses. The risk adjustment results of the Risk Adjustment Working Group (Antioch et al 2007) provides some insights into the key independent variables that could be used to risk adjust DRG data across many hospitals that arise from multiple regression analyses. Such risk adjustment variables may also provide some insights into the Productivity Commissions in its proposed multivariate analysis, given the variables have been already been analysed in the data from a very large Australian State.

2.3 IMPROVING THE FEASIBILITY OF FUTURE COMPARISONS

The most significant development of the national implementation of the NHA under which governments have agreed to report nationally consistent progress measures and to adopt a nationally consistent approach to ABF for public hospitals by 2014-15 will certainly require the development and reporting of indicators using the same methodology across Australia. Further, the Reform Commission has recommended the use of ABF for both public and private hospitals using casemix classifications (Productivity Commission, 2009). The foregoing discussion has highlighted some key issues associated with conceptual and data issues in comparing efficiency performance across hospital types using AR-DRGs and the need for risk adjustment of the data. The initial use of risk adjustment in Victoria has assisted in the improvements of the funding models in that State in ABF and may offer some insights.

[3] http://www.nhhrc.org.au/internet/nhhrc/publishing.nsf/Content/297-interim/$FILE/298%20-%20Submission%20attachment%20-%20Dr%20Kathryn%20Antioch.pdf

Further, the more recent discussions by Antioch (2008) in the context of the NHA reforms also related to risk adjustment of the formulae of the (previous) Australian Health Care Agreements (AHCA). This represented yet another application of the use of risk adjustment in financing to improve equity using either relative risk scores or average cost weights as discussed below.

A related issue for consideration by the Productivity Commission may be use of the classification system called *Diagnostic Cost Group Hierarchical Condition Categories* (DCG-HCC) as a potential risk adjuster. This USA classification system has been calibrated in Victoria through the deliberations of the RAWG and the results of that work reported in the Antioch et al (2007). DCG-HCCs hold potential for risk adjustment is several ways. In Antioch et al (2007, pg 211 and 212) we suggested the potential to use the relative risk scores of the DCG-HCC as potential risk adjusters when used with a DRG system. This could be used as a type of 'severity marker' to adjust for *with-in DRG severity*. Another application of the DCG-HCC *relative risk scores* is in the context of the risk adjustment reform of the formulae of the (former) AHCA (See Antioch, 2008) for further details. In that connection the use of the AR-DRG average *cost weight* was also identified as a way of risk adjusting the formulae.

A key issue that may be of interest into the future might involve an analysis to *more fully understand the reasons for greater cost effectiveness (or efficiencies) achieved at specific hospitals or for certain hospital types*. Whilst the proposed risk adjustment analyses could provide some insights, there could be additional analyses of both health outcomes along with cost and ALOS analyses and in connection with specified new Evidence Based Medicine (EBM) initiatives. The papers by Antioch (2008, 2009) highlight the EBM initiatives implemented along with the risk adjustment reforms at Bayside Health that contributed to greater cost effectiveness by improving health outcomes along with reducing costs and average length of stay. They provide details of the evidence for cost effectiveness improvements (See also Antioch et al 2001 and Western Health 2006). The EBM initiatives involved the integration of economic and clinical evidence into clinical practice using methodology of the NHMRC (1999, 2000a, 2000b 2001), Antioch Jennings and Botti, et al (2002) and Antioch (2007). Similar initiatives may be occurring across Australia and the impact of such initiatives and their relationship to efficiencies in hospitals may be worthy of further consideration by the Productivity Commission into the future.

From an international perspective, the Productivity Commission may have some interest in the deliberation of the Guidelines and Economists Network International (GENI) which is spearheading initiatives world-wide about, inter alia, the implementation of cost effectiveness, best practice and efficiencies into national regulation and financing systems across all sectors of the industry. The participation on GENI's Board has greatly assisted in developing the vision by Antioch (2008, 2009), especially in the context of the NHC reforms on risk adjustment and EBM. GENI recently addressed its deliberations in context of the Global Financial Crisis at the International Health Economists Association conference during July 2009 in Beijing China. The Terms of Reference for GENI along with the context of its work and the Beijing meeting are hereby provided for further consideration.[4]

3. RECOMMENDATIONS

That you note the above.

PDF ATTACHMENTS TO THIS SUBMISSION. The attachments form part of this formal submission to the PC.
ATTACHMENT 1:

- Antioch KM and Walsh MK (2004a) The risk adjusted vision beyond casemix (DRG) funding in Australia: International lessons in high complexity and capitation. *European Journal of Health Economics* 5: 95-109.
- Antioch KM and Walsh MK (2004b) The risk adjusted vision beyond casemix (DRG) funding in Australia: International lessons in high complexity and capitation. Erratum *European Journal of Health Economics* 5:115

ATTACHMENT 2:

- Antioch KM, Ellis RP, Gillett S et al (2007) Risk adjustment Policy Options for Casemix Funding: International Lessons in Financing Reforms. *European Journal of Health Economics*. 8: 195-212. September.

[4] http://www.healtheconomics.org/congress/2009/satellite-sessions/geni.pdf

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Antioch, KM (2009*) Intergovernmental Agreements: Update on Risk Adjustment of Health Funding and Evidence Based Medicine Implementation*. Paper distributed to all Australian States and Territories and Federal Government, May 2009. Also submission to the Health and Hospitals Reform Commission during June 2009. Submission and attachment:

http://www.nhhrc.org.au/internet/nhhrc/publishing.nsf/Content/297-interim/$FILE/297%20-%20Submission%20-%20%20Dr%20Kathryn%20Antioch.pdf

http://www.nhhrc.org.au/internet/nhhrc/publishing.nsf/Content/297-interim/$FILE/298%20-%20Submission%20attachment%20-%20Dr%20Kathryn%20Antioch.pdf

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