Incorporating Safety and Quality Measures Into Australia's Activity-Based Funding of Public Hospital Services

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ABSTRACT: In a bid to improve quality of care, numerous countries have incorporated rewards and penalties into the funding and pricing of hospital services. This paper outlines recent advances in Australia to incorporate financial penalties for hospital acquired complications (HACs) and avoidable hospital readmissions (AHRs) adjustments into the funding of public hospital services. It describes the work in the development of suitable measures to identify episodes, the design of the analytical approach used for risk adjustment and the calculation of the funding implications including dampening effects to account for the level of risk. Using the 2019 to 20 round of data collection, this paper reports on the risk adjustment analysis, incremental costs of HACs and AHRs, and the funding dampening effects, the paper further discusses the implementation strategies undertaken by the Independent Health and Aged Care Pricing Authority (IHACPA) to ensure transparency, stakeholder consultation and engagement. The paper argues that both the technical development and its implementation strategies have been central to making safety and quality an integral and accepted part of Australia's public hospital funding arrangements.

KEYWORDS: Safety and quality, hospital pricing and funding, hospitals

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Introduction

Health care in Australia is a joint responsibility between the Commonwealth (federal), state and territory governments. Public hospitals are a major component of these shared responsibilities. All Australians have access to public hospital services which, collectively, account for approximately 32% of total annual health care expenditure.[1] Public hospitals are funded by federal, state and territory governments but the 6 state and 2 territory governments are the system managers within their respective jurisdictions. In addition, local hospital networks (LHNs) manage a group of local hospitals, or an individual hospital, linking services within a region.

The Independent Health and Aged Care Pricing Authority (IHACPA – formerly known as the Independent Hospital Pricing Authority – IHPA) was established under the *National Health Reform Agreement* in 2011 with the primary purpose of supporting a nationally consistent system of activity-based public hospital funding. It does so by determining the national efficient price (NEP) of hospital activity each year which, in turn, informs the federal government's contribution towards public hospitals funding.

Local Hospital Network funding is primarily shared between the Commonwealth and the relevant state or territory. The Commonwealth contribution to funding is based on the volume of activity delivered, and the change in funding each year is dependent on the growth in the NEP of activity-based funding (ABF) service delivery. Activity is counted through nationally weighted activity units (NWAU) which are reflective of the complexity of the activity. More complex (and therefore more costly) activities have a higher NWAU value whereas less complex activity has a lower NWAU value. The NWAU is referenced to a value of 1.0 for an average complexity episode of care. The NEP reflects the value of one NWAU.

In April 2016, federal, state and territory governments signed a Heads of Agreement[2] that committed all governments, in conjunction with IHACPA and the Australian Commission on Safety and Quality in Health Care (ACSQHC), to the development of 'a comprehensive and risk-adjusted model to integrate quality and safety into hospital pricing and funding'. An addendum (the addendum) to the *National Health Reform Agreement 2011* (the NHRA) was signed by first ministers to implement this commitment.[2]

The addendum includes a clause that there will be no Commonwealth funding contribution for sentinel events from 1 July 2017, with other hospital acquired complication (HAC) and avoidable hospital readmission (AHR) adjustments to follow. In July 2018, IHACPA introduced a value-based funding adjustment into the national ABF system for Australian public hospitals. The adjustment reduces funding for any episode of admitted acute care where a HAC occurs. HACs are complications which occur during a hospital stay and for which clinical risk mitigation strategies may reduce (but not necessarily

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eliminate) the risk of that complication occurring. The rate of HACs within a hospital is widely seen as a measure of the safety and quality of care provided.[3]

IHACPA further built on its value-based funding adjustment model to include AHRs. IHACPA identifies when a patient is discharged (the initial 'index' episode) and has a subsequent unplanned admission (readmission episode) that could potentially be avoided and reduces funding for the index episode. Like HACs, clinical risk mitigation strategies may reduce the risk of that readmission happening, but it is accepted that they may not necessarily eliminate its occurrence.

This paper explains how IHACPA developed and incorporated risk-adjusted safety and quality adjustments into an existing output-based ABF framework for HACs and AHRs. In particular, we discuss the process by which the adjustments were defined, and how these adjustments were used by the Commonwealth Government in determining funding for the Australian public hospital system, taking an important step towards an outcome-based pricing and funding model.

Background to Quality-Adjusted Funding in Hospital Care

In the decade leading up to the incorporation of HAC and AHR adjustments into the NEP, there had been local and international focus on incorporating, or experimenting with, the inclusion of safety and quality measures within hospital funding systems.

Internationally, in 2008 United States Medicare implemented a policy of not paying for any of 8 HACs, whilst the Patient Protection and Affordable Care Act introduced a programme resulting in reduced payments for those hospitals with the worst risk-adjusted HAC quality measures, whilst the UK had been experimenting with Best Practice Tariffs.[4]

A review of European initiatives to improve quality found that the use of financial incentives to target quality is becoming more widespread.[5] Of the 13 identified hospital quality incentive programmes, 9 have penalties that either withhold reimbursement, adjust the payment depending on performance or impose a predefined fine if the targets are not met. The size of bonus payments or penalties is usually relatively small (<2% of total hospital income) and the payment is almost always made in relation to absolute performance.[5]

In Australia, following on from a report from the Royal Australasian College of Surgeons on variance in outcomes, including rates of HACs per 1000 separations for selected surgical procedures,[6] a number of initiatives were implemented. This included the introduction by Medibank Private of payment adjustments for HACs into their contracts with private hospitals,[7] and an agreement between a private hospital group (Healthscope) and private insurer (Bupa) whereby payments would be foregone for defined 'never events' that occurred in Healthscope hospitals.[8] Queensland Health had also trialled incentives and withholding payments provided to hospitals in relation to safety and quality measures.[9]

At national level in Australia, the legislation which established IHACPA included explicit provision for the consideration of safety and quality mechanisms within the NEP. IHACPA's first policy scoping paper in 2011, 'Towards a Pricing Framework' considered how safety and quality measures could be accounted for in ABF.[10]

IHACPA considered adopting the USA's Medicare list of HACs and exclude these from consideration in Diagnosis Related Group (DRG) assignment. Whilst there was support from peak bodies to incorporate quality into pricing considerations at that time, there was concern among some stakeholders about the adaptation of the USA's Medicare list as well as a general concern about IHACPA's remit; with some stakeholders taking the view that quality improvement is within the purview of the states and territories as system managers, and/or clinicians.

In the end, an Australian version of a HAC list was developed in collaboration between IHACPA and the ACSQHC to explore options for including quality and safety considerations in the NEP through a Joint Working Party of senior clinicians, nominated by all levels of government to do this.

From 2013 onwards, the Joint Working Party commissioned a series of projects including a 'proof of concept' to (1) identify whether the draft set of HACs was clinically meaningful, feasible to monitor and useful to clinicians; (2) assess how accurately and completely HACs were being reported; and (3) develop resources to improve reporting. The draft set of HACs were subject to public consultation in 2014 as well as the Council of Australian Government (COAG) Health Council.

For AHRs, relevant readmissions were defined 'for a condition or conditions arising from complications of the management of the original condition'. Based on this definition, the ACSQHC developed a list of AHRs, including condition-specific readmission timeframes, which are related to the initial admission episode (index admission), avoidable through improved clinical management in the index admission and/or suitable discharge planning and follow-up, and measurable through coded data generated from the patient medical record. The work for AHRs heavily relied on the prior HAC work, with the majority of AHRs having a HAC-related principal diagnosis.

A significant body of clinically-led local work had been amassed which had been overseen by key stakeholders resulting in a well-defined, clinician-supported list of HACs and AHRs based on the 4 tenets of preventability, patient impact, service impact and clinical priority. Tables A1 and A2 in the Supplemental Materials detail the latest HAC and AHR groups.

The federal, state and territory governments formally signed an addendum to the NHRA to implement safety and quality pricing at a national level for HACs from 1 July 2018 and AHRs from 1 July 2021.[11,12]

In addition to a transparent approach to the technical development of the methodology, IHACPA undertook a 2-year

shadowing exercise whereby the impact of HAC and AHR pricing adjustments was assessed before full implementation.

Methodology Used by IHACPA to Incorporate Safety Quality Into the National Price

The safety and quality funding adjustment methodology is built on Australia's nationally consistent patient-level hospital activity data which includes a range of clinical measures, its patient-level cost data and, for the purpose of AHRs, the ability to track patient hospitalisations over time.

Patient-level activity data containing demographic and clinical information is collected through the ABF quarterly activity data submission, while patient level cost data is provided annually through the National Hospital Cost Data Collection (NHCDC). Both datasets are collected by states and territories. These data enable the central concept of quality to be measured, tracked across episodes of care and quantified in terms of their impact on hospital costs.

For both HACs and AHRs, the funding adjustment methodology consist of 4 essential steps:

- Identification of HAC and AHR events
- Estimation of incremental costs associated with HAC and AHR events
  - Estimation of the additional cost of a HAC or;
  - Efficient price of a readmission episode following an eligible index episode.
- Risk adjustment to account for the underlying level of patient risk of a HAC or AHR to occur
- Final funding adjustment based on the cost impacts of the adverse event, adjusted for the risk of occurrence.

A visual summary of the structure of the funding adjustments is shown in Figure 1. The remainder of this section will describe each of these 4 steps in more detail for HACs and AHRs, respectively.

Identification of HAC and AHR events

For HACs, episodes are identified at a patient level through a combination of diagnosis codes and the Condition Onset Flag (COF), which indicates whether a condition arose during the episode of care and would not have been present on admission. The consistency of application of the COF was tested as part of the programme of work on HACs undertaken by IHACPA and the ACSQHC. For AHRs, relevant index episodes and subsequent readmissions are identified using linked patient-level admitted episode data including the principal diagnosis code of the readmission episode.

Estimation of incremental costs associated with HAC and AHR events

For HACs, 3 years of activity and cost data are used to estimate the incremental cost associated with each type of HAC. The method used is a mixed-effect linear regression model fit to non-HAC episodes to estimate the impact of an episode's DRG and length of stay on the cost of an episode of care. The result of this model provides an estimate of the cost of an episode where no HAC is present. The model is then applied to HAC episodes to estimate the cost for episodes with a HAC, had the HAC not occurred. For each HAC group, this gives an estimate of the cost impact of a HAC. This process gives 2 estimates for each HAC, depending on the intended application. Either:

- an estimate of the additional cost of a HAC relative to an episode without a HAC (the *incremental cost*), or
- the proportion of cost of a HAC episode which is due to the presence of a HAC (the *adopted adjustment*).

For AHRs, the incremental cost is equal to the efficient price of the readmission episode.

For both HACs and AHRs, the adopted adjustment is used to discount the price used for the Commonwealth funding calculation. The adopted adjustment is reduced depending on the estimate risk of an adverse even occurring to account for the underlying level of risk of a hospital readmission. Sentinel events use an adopted adjustment equal to the efficient of the episode, and are not subject to risk adjustment.

Risk adjustment

IHACPA's approach to risk adjustment is based on the principle that hospitals that treat more high-risk patients should not be disadvantaged compared to hospitals that treat fewer such patients. As such, the approach seeks to account for the fact that some patients will be at higher risk of adverse events due to factors such as their age and the presence of other comorbidities.

For HACs, a logistic regression model is fit to estimate the probability of a HAC using risk factors as independent variables including demographic and clinical variables. This approach was based on work of Cheng et al[13] Risk factors were initially based on the work of Cheng et al, and further refined through a combination of consultation with IHACPA's Clinical Advisory Committee (CAC) and a stepwise model selection process to evaluate the significance of each risk factor. This process is outlined in the first consultation paper for the HAC risk adjustment model.[14] See Table A1 in the Supplemental Materials for details on the risk factors used in the regression model for each HAC.

The coefficient for each risk factor is then transformed into a complexity score from 0 to 100 and is used to estimate the probability of a HAC occurring, which is then transformed to a complexity score. The complexity scores are then used to assign each episode into 1 of 3 complexity groups: 'low', 'moderate' and 'high'. The thresholds for each group are empirically set to maximise between-group risk and minimise within-group risk variation, while controlling for a reasonable number of episodes in each group.

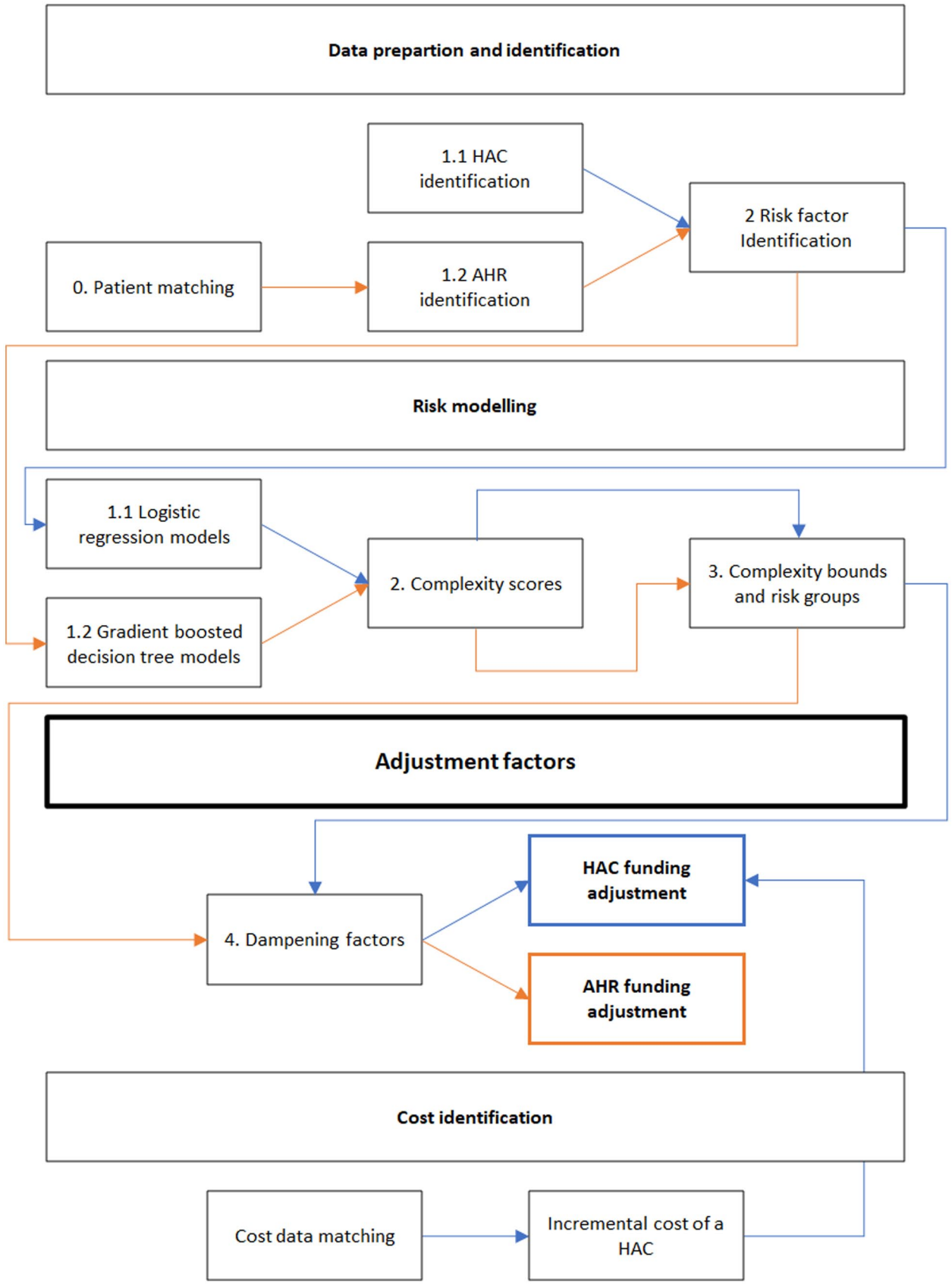

Figure 1. Structure of the HAC and AHR funding adjustment.

The risk adjustment process for AHRs follows a similar methodology to that of HACs: a risk model is fit to index episodes to estimate the probability of readmission, based on a list of clinical and demographic risk factors. One key difference being that the risk model for each AHR group is determined using a set of gradient-boosted decision-tree models

(GBDT) instead of logistic regression. GBDT is used in favour of logistic regression due to the extreme rarity of readmission events which resulted in very poor performance when using logistic regression. The GBDT models showed vastly improved performance, as they account for more complex interactions between risk factors and reduce the chance of overfitting as far as possible. The GBDT framework used is LightGBM.

Table A2 in the Supplemental Material shows the risk factors used in the model for each AHR model. Risk factors are selected based on the variable importance metric calculated by LightGBM. To select risk factors, the GBDT model was fit to 3 samples of data spanning 6 years, with 4 consecutive years' of data used for each sample. Risk factors that were selected in at least 2 of these 3 models are then considered by IHACPA's CAC before being implemented for pricing.

For both HACs and AHRs, the complexity group is directly proportional to the probability (or risk) of an adverse event occurring.

Funding adjustment

For both HACs and AHRs, the funding adjustment is an adjustment to the efficient price of an episode used to calculate the Commonwealth contribution to public hospital funding. The adjustment applied at an episode level by reducing the efficient price of an episode based on an incremental cost associated with the adverse event. For HACs this is based on the incremental cost of the HAC event and for AHRs it is based on the efficient price of the re-admission.

The size of the funding adjustment is dependent on the type of adverse event (ie, the HAC or AHR group), the associated incremental cost for the event and the complexity group of the patient. The adopted adjustment discussed in the incremental cost subsection above is the maximum adjustment which is applied to episodes assigned a low complexity group. For each episode assigned to a moderate or high complexity group, and thus considered at higher risk of an adverse even occurring, the adopted adjustment is reduced by a condition-specific *dampening factor* before being deducted from the efficient price for the episode.

For each HAC, the dampening factors are based on the difference in case-mix adjusted costs of HAC and non-HAC episodes in each complexity group. Empirically, it is shown that the difference in cost between HAC and non-HAC episodes is much greater in the low complexity group and that this differential is reduced as complexity increases.[15] These differentials form the basis for determining the dampening factors for each complexity group and for each HAC. Episodes belonging to the lowest complexity group receive no dampening.

The HAC adjustment used in the NWAU calculation for an episode with an occurrence of HAC group r in risk complexity group i is then given by

$$\begin{aligned}\text{HAC adjustment} = {} & \text{Episode price weight} \\ & \times \text{HAC}_r \text{ adopted adjustment} \\ & \times \text{HAC dampening factor}_{i,r}\end{aligned}$$

For AHRs, the dampening factor for AHR group r and complexity group i is the ratio of the mean complexity score for AHR r in the low complexity group to the mean complexity score in complexity group i. As with HACs, the dampening factor is always equal to 1 for the low complexity group, implying that there is no dampening effect for such episodes. For the medium and high complexity groups, the denominator is greater than the numerator and hence the dampening factor will take on a value less than 1.

The AHR adjustment used in the NWAU calculation for an index episode resulting in an AHR in category g in risk complexity group i is then given by

$$\begin{aligned}\text{AHR adjustment} = {} & \text{AHR Episode price weight} \\ & \times \text{AHR dampening factor}_{i,r}\end{aligned}$$

For both HACs and AHRs, the funding adjustments are calculated at the episode level, and deducted from the total efficient price of an episode. Where there is more than HAC in an episode, the HAC with the greatest cost impact is assigned, and any other HACs are ignored. An episode may receive both a HAC and AHR adjustment.

Impact on Prices and NWAU

Summary and calculation of funding adjustment

The methodology produces results in (maximum) for adopted adjustments, complexity scores and dampening factors for each HAC and each AHR. These come together to inform the final funding adjustment that is applied on an episodic basis.

Note that the HAC adjustment is a single percentage price adjustment to the total episode efficient price, as summarised in Table 1. For AHRs, the funding adjustment depends on the efficient price of the readmission episode, so there is no such single adjustment percentage to apply to the index episode of an AHR. Instead, the adjustment is calculated based on the readmission episode efficient price, multiplied by the dampening factor. This is summarised in Table 2.

Impact on efficient price

The adjustments outlined in Tables 1 and 2 are applied at an episode level for the calculation of the Commonwealth contribution of public hospital funding. Figure 2 shows the total proportion of weighted activity in NWAU attributable to the HAC adjustment in Australia between 2015 to 16 and 2021 to 22. That is, each point is equal to (HAC adjustment in NWAU) divided by (sum of NWAU and HAC adjustment). The denominator can alternatively be described as the NWAU without the HAC adjustment.

Table 1. HAC complexity groups, dampening factors.

HAC GROUP	COMPLEXITY GROUPS								
	COMPLEXITY GROUP THRESHOLD			DAMPENING FACTORS			ADJUSTMENTS		
	LOW	MODERATE	HIGH	LOW	MODERATE	HIGH	LOW (%)	MODERATE (%)	HIGH (%)
1	1	65	73	1.0000	0.6010	0.5277	10.9	6.6	5.8
2	1	55	62	1.0000	0.8249	0.7565	2.9	2.4	2.2
3	1	74	82	1.0000	0.7520	0.6063	7.9	5.9	4.8
4	1	73	76	1.0000	0.6120	0.4568	10.8	6.6	4.9
6	1	76	81	1.0000	0.5786	0.2530	12.6	7.3	3.2
7	1	65	70	1.0000	0.7593	0.5464	9.2	7.0	5.0
8	1	84	85	1.0000	0.3247	0.2830	17.9	5.8	5.1
9	1	62	68	1.0000	0.8343	0.6335	8.2	6.9	5.2
10	1	60	66	1.0000	0.3923	0.0137	9.6	3.7	0.1
11	1	73	79	1.0000	0.7160	0.5414	9.2	6.6	5.0
12	1	54	63	1.0000	0.8161	0.6404	6.7	5.5	4.3
13	1	66	72	1.0000	0.8784	0.6970	7.5	6.6	5.2
14	1	74	78	1.0000	0.7034	0.4949	10.5	7.4	5.2
15.2	1	N/A	56	1.0000	N/A	0.7275	32.3	N/A	23.5

Source: NEP22 Risk adjustment model for hospital acquired complications – Technical specifications.

Table 2. AHR complexity groups, dampening factors.

AHR GROUP	COMPLEXITY GROUPS								
	COMPLEXITY GROUP THRESHOLD			DAMPENING FACTORS			ADJUSTMENTS		
	LOW	MODERATE	HIGH	LOW	MODERATE	HIGH	LOW	MODERATE	HIGH
1	0	46	64	1	0.481	0.356	Episode specific: the index episode adjustment equals dampening factor multiplied by readmission episode price weight		
2	0	66	80	1	0.562	0.471			
3	0	91	95	1	0.247	0.237			
4	0	75	88	1	0.575	0.495			
5	0	81	88	1	0.714	0.652			
6	0	72	86	1	0.526	0.451			
7	0	59	87	1	0.507	0.38			
8	0	64	85	1	0.446	0.363			
9	0	79	90	1	0.476	0.426			
10	0	79	89	1	0.518	0.462			
11	0	58	76	1	0.439	0.337			
12	0	52	72	1	0.557	0.415			

Source: NEP22 Risk adjustment model for avoidable hospital readmissions – Technical specifications.

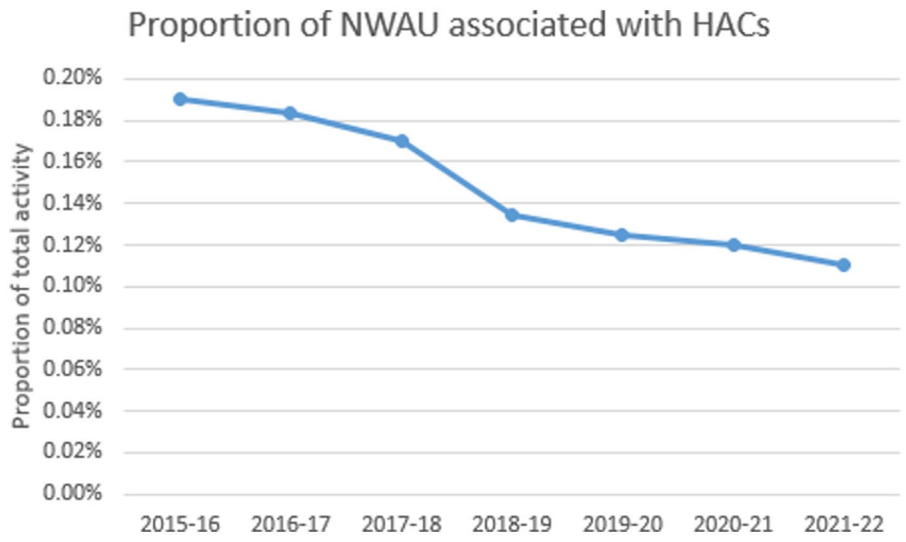

Figure 2. HAC population weighted adjustment time series.

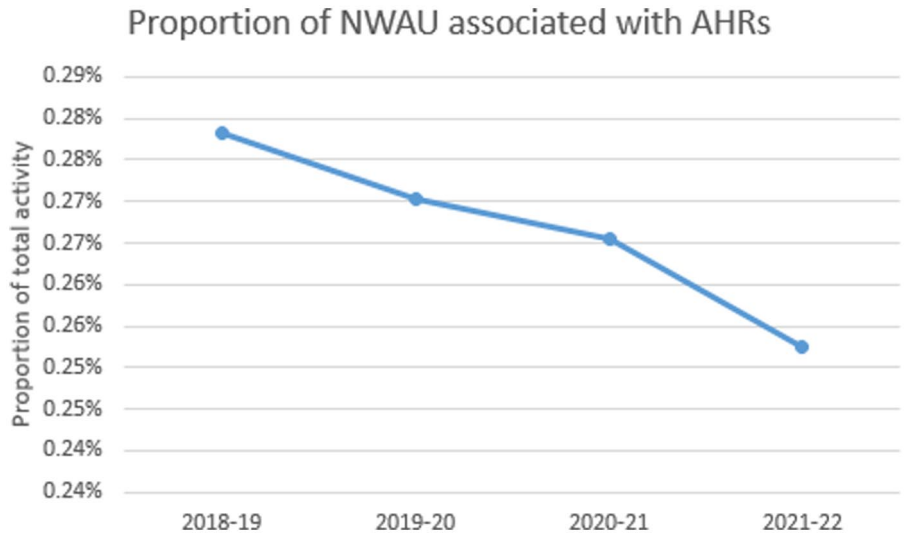

Figure 3. AHR population weighted adjustment time series.
Source: IHACPA ABF data collection.

Figure 2 shows a consistent decline in the proportion of NWAU attributable to HACs, with a noticeably larger decrease in the proportion of total activity associated in HACs from 1 July 2018, which was the year in which the adjustment was introduced.

Figure 3 is an analogue of Figure 2 for AHRs instead of HACs. Figure 3 shows the total proportion of weighted activity in NWAU attributable to the AHR adjustment in Australia between 2018 to 19 and 2021 to 22. Due to the limitations in linking patient level data to track readmissions before 2018 to 19, AHR NWAUs were not calculated before that year. Each point in Figure 3 is equal to (AHR adjustment in NWAU) divided by (sum of NWAU and AHR adjustment). The denominator can alternatively be described as the NWAU without the AHR adjustment.

Figure 3 shows a steady decline in readmissions attributable to AHRs each year, noting that the national AHR funding adjustment was introduced on 1 July 2021.

Discussion

The results reported here indicate that the number of adjusted NWAU due to HACs and AHRs is falling over time. However, at this stage it is not possible to attribute these early trends to the implementation of the financial penalties. Rigorous evaluation on how LHNs respond to the financial incentives and its impact is required. In considering the broader policy and service delivery implications, while patient selection may be seen as an unintended consequence of these adjustments, this programme is designed to be implemented for the Australian public hospital system only as part of a universal healthcare system. As public hospitals have clear service provision obligations, there are limited opportunities for these hospitals to partake in cream-skimming patient selection behaviours.

Internationally, there are only a few studies that have conducted evaluations of safety and quality financial incentives, and most of these have focused on programmes in the US and the UK. These small number of studies offer mixed results on

the impact of financial penalties for hospitals on safety and quality but do offer important lessons in the evaluation methodology.

The role of funding for quality and safety in Australian health care continues to evolve. As part of IHACPA's role in determining the annual national efficient price of hospital services each year, it also conducts analysis on the necessary elements to implement the safety and quality measures as new data becomes available. Over time, the risk adjustment model has become more sophisticated and will continue to do so. Future model development could look at differential impacts in incremental costs for certain population groups, episodes with multiple HACs, and the impact that HACs and AHR have on DRG categorisation.

Furthermore, IHACPA has recently expanded the publicly available National Benchmarking Portal to include quality and safety measures. The portal is available to the public and allows users to benchmark hospital performance over time as well as against peers with respect to cost per NWAU, HACs and AHRs. This enhanced level of transparency provides important information to hospital managers and the wider community for the purpose of reporting, prioritising safety and quality interventions and evaluation.

Conclusion

Australia's risk-adjusted safety and quality adjustments for HACs and AHRs represents a significant milestone in implementing quality measures into public hospital funding arrangements. It is not just the technical approach that makes Australia's experience worthy of review; the ability to implement reforms at scale into a complex system with many decision makers and viewpoints within a relatively short period of time is also noteworthy. These achievements were made possible because of the extensive policy and technical work undertaken and relationships built at multiple levels prior to government decision making, and the open consultative approach to the development of the final funding approach among stakeholders with a common interest to place patient care at the centre of the hospital system.

The positive Australian experience in imbedding safety and quality into funding affirms earlier recommendations[16] that suggest involving all relevant stakeholders from the start of the programme development is key to its success, as is monitoring and structured feedback.

Author Contributions

Samuel B.G. Webster – conceived, drafting, analysis.
Sarah E. Neville – conceived, initial drafting, reviewing.
Jennifer Nobbs – conceived, initial drafting, reviewing.
Jada Ching – drafting, analysis.
Kees van Gool – direction, drafting and review.

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Supplemental Material

Supplemental material for this article is available online.

REFERENCES

1. AIHW. Health expenditure in Australia 2019–20. 2021. Accessed January 6, 2023. https://www.aihw.gov.au/reports/health-welfare-expenditure/health-expenditure-australia-2019-20/contents/overview-of-data-sources-and-methodology/the-australian-national-health-account
2. Council of Australian Government (COAG). Heads of Agreement: public hospital funding. 2016. Accessed January 6, 2023. https://federation.gov.au/sites/default/files/about/agreements/Heads_of_Agreement_between_the_Commonwealth_and_the_States_on_Public_Hospital_Funding-1April2016.pdf
3. KPMG. Final report on National-set-of-high-priority-hospital-complications. 2013. Accessed January 6, 2023. https://www.safetyandquality.gov.au/sites/default/files/migrated/National-set-of-high-priority-hospital-complications-Dec-2013.pdf
4. Eagar K, Sansoni J, Loggie C, et al. A literature review on integrating quality and safety into hospital pricing systems. *Centre for Health Service Development, University of Wollongong*. 2013. Accessed January 6, 2023. https://www.safetyandquality.gov.au/publications-and-resources/resource-library/literature-review-integrating-quality-and-safety-hospital-pricing-systems
5. Eckhardt H, Smith P, Quentin W. Chapter 14. Pay for quality: using financial incentives to improve quality of care. In: Busse R, Klazinga N, Panteli D, Quentin W, eds. *Improving Healthcare Quality in Europe*. OECD Publishing; 2019:357-397.
6. Royal Australian College of Surgeons. Surgical variance report. 2016. Accessed January 6, 2023. https://www.surgeons.org/Resources/reports-guidelines-publications/surgical-variance-reports
7. Medibank Private. Submission to the Independent Hospital Pricing Authority on Pricing Framework for Australian Public Hospital Services 2017-18. 2017. Accessed January 6, 2023. https://www.ihacpa.gov.au/sites/default/files/2022-02/medibank_1_2017%E2%80%9318.pdf
8. Health Scope and BUPA. Building upon a shared commitment to quality health care. *Media Release*. 2014. Accessed January 6, 2023. https://www.safetyandquality.gov.au/sites/default/files/migrated/BUPA-Healthscope-Media-Release-June-2014.pdf
9. Queensland Health. *Health Funding Principles and Guidelines 2013-14*. Queensland Health; 2013.
10. Independent Health and Aged Care Pricing Authority. Activity based funding for Australian public hospitals: towards a pricing framework. 2011. Accessed January 6, 2023. https://www.ihacpa.gov.au/resources/activity-based-funding-australian-public-hospitals-towards-pricing-framework
11. Council of Australian Government (COAG). Schedule I – addendum to the National Health Reform Agreement: revised public hospital arrangements. 2018. Accessed January 6, 2023. https://federalfinancialrelations.gov.au/sites/federalfinancialrelations.gov.au/files/2021-07/Addendum_to_the_National_Health_Reform.pdf
12. Council of Australian Government (COAG). Schedule J – addendum to the National Health Reform Agreement: revised public hospital funding and health reform arrangements. 2021. Accessed January 6, 2023. https://federalfinancialrelations.gov.au/sites/federalfinancialrelations.gov.au/files/2021-07/NHRA_2020-25_Addendum.pdf
13. Cheng C, Scott A, Sundararajan V, Yong J. On measuring the quality of hospitals. *J Health Organ Manag*. 2018;32:842-859.
14. Independent Health and Aged Care Pricing Authority. Risk adjustment model for hospital acquired complications technical specifications. 2017. Accessed January 6, 2023. https://www.ihacpa.gov.au/sites/default/files/202202/risk_adjustment_model_for_hospital_acquired_complications_-_technical_specifications_v1.0_july_2017.pdf
15. Independent Health and Aged Care Pricing Authority. Pricing and funding for safety and quality - risk adjusted model for hospital acquired complications. 2022. Accessed January 6, 2023. https://www.ihacpa.gov.au/resources/national-pricing-model-technical-specifications-2022-23
16. Eijkenaar F. Key issues in the design of pay for performance programs. *Eur J Health Econ*. 2013;14:117-131.