

The logo features the letters 'HPA' in a large, white, serif font. A thin white line curves through the 'H' and 'P'. Below 'HPA', the words 'HEALTH POLICY ANALYSIS' are written in a smaller, white, sans-serif font. The background is a dark blue gradient with several wavy, horizontal lines in shades of blue and white that sweep across the bottom half of the slide.

HPA

HEALTH POLICY ANALYSIS

Cost impact of hospital acquired diagnoses and
impacts for funding based on quality signals

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A smaller version of the HPA logo, with 'HPA' in a blue serif font and 'HEALTH POLICY ANALYSIS' in a smaller blue sans-serif font below it.

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HEALTH POLICY ANALYSIS



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- A copy of the full report can be found at:
- <http://www.safetyandquality.gov.au/wp-content/uploads/2014/06/Analysis-of-hospital-acquired-diagnoses-and-their-effect-on-case-complexity-and-resource-use-Dec-2013.pdf>



Key study questions

- The impact of excluding hospital-acquired diagnoses in assigning Australian-Refined Diagnosis Related Groups (AR-DRGs).
- The incremental impact of hospital-acquired diagnoses on costs and bed days that are incurred over and above the cost of uncomplicated care. (Focus of this presentation).



The Condition Onset Flag (COF)

- Collected in a standardised way on a national basis in Australia since 1 July 2008.

Limitations:

- Not all hospital acquired conditions can be prevented.
- Some relate to complications of the primary conditions leading to the hospital admission, rather than hospital care itself
- But: Many hospital-acquired conditions have been shown to be amenable to a reduction in their rates in the literature.
- The COF is applied to diagnoses in the context of a **single episode of care**. However impact may be reflected in other episodes (e.g. transfers and re-admissions).
- The COF is **not applied to procedures**. Procedures arising from COF diagnoses are not identified.



Data sources

- Admitted Patient Care (APC) National Minimum Data Set (NMDS)
- National Hospital Cost Data Collection (NHCDC):
 - NHCDC represents a sample of around 80% of APC episodes



Impact on DRG assignment

- Episodes regrouped to AR-DRGs once diagnoses flagged as having an onset during the hospital stay were ‘removed’.
- Overall, there was a change in AR-DRG for 3.1% of episodes.
- Around 0.2% of episodes were grouped to another Adjacent DRG (i.e. they were allocated to an entirely different AR-DRG).
- Around 2.9% of episodes changed the severity level within an Adjacent DRG block



Impact on DRG assignment

- Of the approximately 19,500 valid ICD-10-AM diagnosis codes (7th edition), around 3,000 codes are recognised as complications or comorbidities that can impact AR-DRG assignment.
- Procedures related to hospital acquired conditions are not identified.



LOS and cost impact

- Analysis conducted on:
 - A sample of 49 high volume AR-DRGs
 - Only hospitals with good recording of COF
 - Approximately 400,000 costed episodes
 - 16.8% of episodes had a hospital acquired condition coded.



Pre analysis processing

- Applications of the data cleansing algorithm developed by Jackson et al. 2009 related to the CHADx research.
- Grouping hospital acquired diagnoses into:
 - Individual CHADx classes
 - Major CHADx groups
 - Subgroup of CHADx



Cost and length of stay impact Methodological challenges

- Biases:
 - Selection bias: The comparison between the complicated and uncomplicated cases are driven by other factors that are not controlled.
 - Endogeneity bias: Longer lengths of stay may be a ‘causal’ factor leading to incident cases on COF diagnoses, not the other way around (or there may be two way causation).
- Interactions:
 - Between the underlying condition and the hospital acquired conditions
 - Between different hospital acquired conditions.



Cost and length of stay impact - Methods

Regression model run for each selected Adjacent DRGs

- OLS estimation
- Plus Generalized Linear Model (GLM) estimation with a log link function and a gamma distribution

Specification of models estimated

OLS estimation

$$\text{MODEL A1: } Cost_i = \alpha + \beta_1 COF_i + \sum_m \gamma_k Control_{ki} + \mu \quad (1)$$

$$\text{MODEL A2: } Cost_i = \alpha + \sum_n \beta_j MCHADx_{ji} + \sum_m \gamma_k Control_{ki} + \mu \quad (2)$$

GLM estimation

$$\text{MODEL A2: } Cost_i = \exp(\alpha + \sum_n \beta_j MCHADx_{ji} + \sum_m \gamma_k Control_{ki}) \quad (9)$$

Control variables

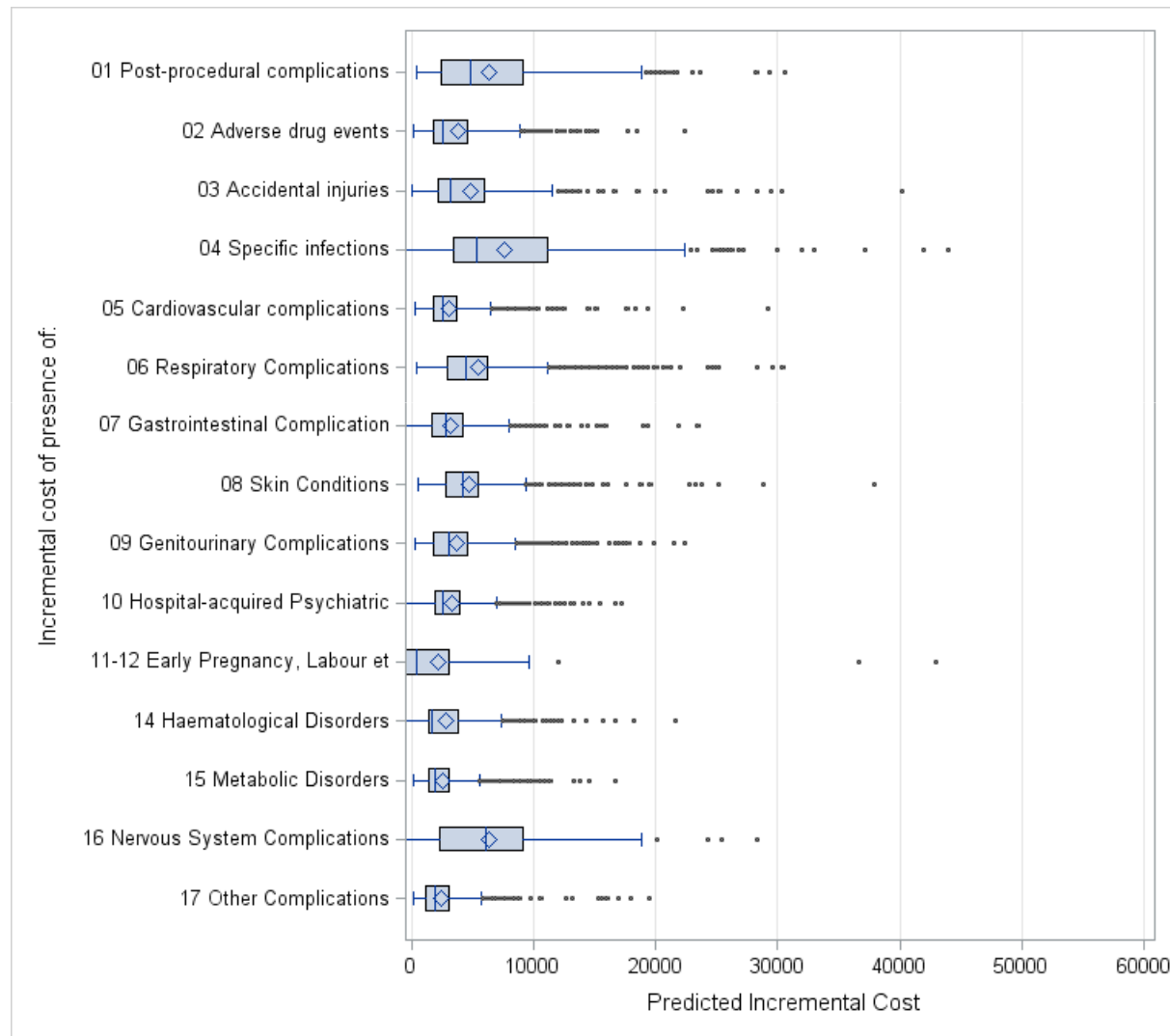
- PCCL
- Patient age (4 groups)
- Emergency admission status
- Discharge status of death
- Same day episodes



Cost and length of stay impact - Results

- Mean incremental impact of the presence of any (one or more) COF diagnosis was estimated to be 5.3 days per episode
- Mean incremental impact of the presence of any COF diagnosis was estimated to be \$9,244 per episode.
- Median impact \$6,710 per episode.
- Costs also estimated for specific hospital acquired conditions and groups of hospital acquired conditions.

Cost impact – Major CHADx Groups



What additional costs and/ or length of stay are associated with hospital-acquired diagnoses?

	Episodes with COF diagnoses	GLM mean cost impact \$	Total cost estimate \$m	GLM mean length of stay impact (days)
Selected hospital acquired conditions with high cost per episode impact				
3.04 Injury due to assault	87	15,032	1.31	3.9
1.08 Disruption of wound	649	12,200	7.92	5.3
1.20 Post-procedural disorders: Respiratory system	967	10,604	10.25	2.5
1.06 Foreign body or substance left following procedure	17	9,821	0.17	1.6
2.17 Anaphylactic shock due to correct drug properly administered	68	9,447	0.64	2.8
4.03 Methicillin resistant agent	123	9,208	1.13	3.6
Selected hospital acquired conditions with high total cost impact				
15.02 Electrolyte disorders w/o dehydration	9,808	2,797	27.43	1.1
5.03 Cardiac arrhythmias, conduction disturbances & abnormal heart beat	8,566	2,335	20.00	3.7
9.02 Urinary tract infection	3,449	4,950	17.07	0.9
5.06 Hypotension	9,331	1,735	16.19	0.8
6.03 Acute lower respiratory infections (incl influenza & pneumonia)	2,742	5,710	15.66	2.6
8.01 Pressure Ulcers	1,866	5,892	10.99	2.8



Cost and length of stay impact - Results

- Impacts varied significantly across Adjacent DRG
- Incidence of hospital acquired conditions varied across Adjacent DRG

Cost and length of stay impact – Proportion of episodes in which a major CHADx diagnosis is reported

	01 Post-proced-ural comp.	02 Adverse drug events	03 Accidental injuries	04 Specific infections	05 Cardio-vascular comp.	06 Respir-atory Comp.	07 Gastro-intestinal Comp.	08 Skin Conditions	09 Genito-urinary Comp.	10 Hospital-acquired psych. states	11-13 Early Pregnancy, Labour etc	14 Haemat-ological Disorders	15 Metabolic Disorders	16 Nervous System Comp.	17 Other Comp.
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
B02 Cranial Procedures	15.7	3.2	1.8	2.3	14.5	7.7	8.4	4.5	10.3	7.7	0.1	3.9	15.7	9.0	17.3
B70 Stroke and Other Cerebro-vasc	1.5	1.8	1.2	1.1	5.6	3.4	3.9	2.3	5.5	2.7	0.0	0.4	4.4	0.8	5.2
E62 Respiratory Infections/ Inflamm	0.9	1.9	0.7	0.7	4.3	2.0	2.9	1.6	2.0	1.4	0.0	0.8	3.9	0.2	2.6
E65 Chronic Obstructive Airways D	0.6	1.9	0.8	0.6	3.1	1.5	2.3	1.1	1.4	1.2	0.0	0.3	2.7	0.2	2.9
F05 Coronary Bypass W Invasive C	30.7	4.9	0.8	1.4	41.5	23.8	11.6	4.7	14.3	7.5	0.0	16.9	29.7	1.8	10.0
F06 Coronary Bypass W/O Invasiv	24.4	4.0	0.9	1.0	41.2	25.4	8.8	3.0	12.4	6.8	0.0	14.6	27.3	1.8	8.9
F07 Other Cardio-thoracic/Vascula	26.8	5.3	0.6	2.0	40.2	27.3	11.2	4.7	13.6	5.8	0.1	16.2	32.9	2.2	15.2
F10 Intervent-ional Coronary Proce	10.7	2.1	0.3	0.3	10.4	2.3	2.8	0.9	2.5	1.2	0.0	0.9	3.5	0.3	4.6
F14 Vascular Procedures Except M	9.6	1.6	0.4	0.4	5.2	1.6	1.8	1.3	2.2	0.9	0.0	1.5	3.4	0.4	3.0
F41 Circulatory Disorders W AMI V	5.8	1.8	0.3	0.3	6.0	1.5	2.1	0.8	2.0	0.9	0.0	0.7	2.5	0.3	3.1
F42 Circulatory Disorders W/O AM	3.6	0.8	0.1	0.1	2.8	0.5	0.7	0.4	0.7	0.3	0.0	0.2	1.1	0.1	1.9
F62 Heart Failure and Shock	1.2	2.5	1.1	0.5	5.6	2.1	3.0	1.8	3.9	1.4	0.0	0.6	4.8	0.4	3.1
F74 Chest Pain	0.1	0.3	0.1	0.0	0.5	0.1	0.2	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.5
G02 Major Small and Large Bowel I	26.9	4.1	0.9	2.8	17.4	10.8	15.0	4.8	10.5	5.4	0.0	7.5	20.9	0.9	9.3
H08 Laparo-scopic Chole-cystector	5.2	0.8	0.1	0.2	2.6	1.5	2.4	0.5	1.4	0.5	0.0	0.3	2.0	0.1	2.2
I03 Hip Replace-ment	10.9	4.4	1.1	0.8	17.7	7.0	9.3	4.8	10.4	7.1	0.0	14.3	13.6	0.7	10.4
I04 Knee Replace-ment	9.0	3.9	1.0	0.3	11.2	4.0	7.7	3.1	5.5	3.1	0.0	8.7	7.5	0.3	9.1
I31 Hip Revision	17.4	5.7	2.1	1.2	21.0	5.5	9.3	6.1	9.1	5.4	0.0	20.5	14.2	0.5	12.0
I68 Non-surgical Spinal Disorders	0.3	1.5	0.4	0.2	1.2	0.7	2.4	0.7	1.6	1.0	0.0	0.2	1.2	0.2	1.5
N04 Hyster-ectomy for Non-Malign	7.9	1.6	0.2	0.2	4.0	1.8	6.3	1.3	3.4	0.5	0.0	2.3	2.8	0.1	4.5
U61 Schizo-phrenia Disorders	0.2	1.4	1.2	0.4	1.2	1.1	2.0	1.0	0.9	1.9	0.0	0.1	0.8	0.5	3.0
U63 Major Affective Disorders	0.5	1.5	1.8	0.5	1.6	1.2	2.5	1.1	1.2	2.5	0.0	0.1	1.2	0.7	3.6



Implications for funding/payment

Options:

Do not incorporate into funding. Use hospital acquired data only for quality improvement.

- A. Maintain the core activity based funding approach as it is. Create a separate funding/payment stream related to performance against quality related measures/benchmarks including those based on hospital acquired conditions.



Options for incorporating into funding

- B. Exclude all hospital-acquired complications in assigning episodes to DRG, but set prices to reflect average across all episodes (complicated and uncomplicated).
- C. Exclude a subset of hospital-acquired complications in the AR-DRG assignment.
- D. Exclude the costs of hospital-acquired complications entirely in calculating the price levels for each DRG. The price payable to hospitals would reflect the average cost of uncomplicated care.



Implications for funding/payment

Issues:

- Targeted vs more comprehensive incentives
 - Targeted incentives may miss some low cost per episode but high volume hospital acquired conditions.
- Size of impact:
 - Option B – No monetary withdrawal, only re-distribution. Around 3% of episodes impacted. Actual payment effect at hospital level relatively modest.
 - Option C – Impact even more modest
 - Option D – This study illustrates some of the challenges/complexity in estimating cost of complicated vs uncomplicated care. If taken at face value, the study suggests option D could potentially withdraw between 12-16% of funding.



Conclusions

- Cost and length of stay impacts of hospital acquired conditions are significant. Between 12.0% - 16.5% of total costs of hospital episodes analysed in this study.
- Commonly occurring conditions with lower average costs are very costly to the broader system and should be considered a legitimate target for safety and quality initiatives.
- We still have a range of challenges in improving and refining measurement. No matter what funding approach is adopted, there is still a need to invest in classification/measurement of hospital acquired conditions, that is:
 - Exhaustive of all possible conditions
 - Ultimately addresses procedures arising