

Complexity in the Australian Emergency Care Classification (AECC)

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The Australian Emergency Care Classification (AECC) uses scores to assign episodes to complexity classes within emergency care diagnosis groups (ECDGs). ECDGS are groupings of diagnoses (as represented by the Emergency department principal diagnosis short list) to reflect models of care in emergency departments.

Regression modelling was used to create the complexity scores. The logarithm of the cost per episode was the response (dependent) variable (to account for the skewed distribution of costs). The predictor (explanatory) variables were the patient's age group, episode end status ('Admitted', 'Not admitted', 'Referred to another hospital', 'Died in emergency department', 'Left at own risk'), triage category (1-5), transport (arrival) mode ('Ambulance, air/helicopter', 'Other') and subcategories of diagnoses within each ECDG (further clinically meaningful clusters of short list diagnoses).

A hierarchical model was specified and estimated using Bayesian methods. In the model, the ECDG was a 'level', resulting in the predictor variables having both a fixed effect (the same across all ECDGs) and an effect specific to each ECDG. The Bayesian method allowed information from other ECDGs to be used when estimating model coefficients for a specific ECDG. The predicted value of the model (the logarithmic of cost) yielded the complexity score, which was scaled to ensure values started from zero (making them easier to interpret).

Table 1 shows an example of how the complexity score is calculated. The coefficients that apply to an episode are summed to yield the predicted value. These are then scaled to generate the complexity score: the predicted value is 7.09, and scaled complexity score is 6.19.

Table 1 Example calculation of complexity score: episode assigned to ECDG E0490 Respiratory disorders, other

	Intercept	Sub-group	Transport mode	Episode end status	Triage category	Age group	Interactions: Admitted and		Predicted value	Scaled complexity score
							Triage	Age		
Value:		E0491	Arrival by ambulance	Admitted	4	80-84	4	80+		
Sum of scores:	5.91	-0.11	0.21	0.32	0.25	0.42	0.14	-0.05	7.09	= 6.19

In the next step the scores were clustered within each ECDG to create end classes. Initially, scores were clustered into 40 categories across the whole data set. Each ECDG was then considered in turn, to identify the best way of grouping the 40 categories to achieve up to 5 end classes representing varying levels of complexity. In the final step, the overall number of end classes was optimised by trading off the number of splits, so that the total number of end classes would be manageable — one of the features of classification systems used for pricing. For example, ECDG *E0490 Respiratory disorders, other* shown in Table 1 was split into 4 classes. The scaled complexity score of 6.19 groups the episode into the 'B' class — the second highest complexity within the ECDG.

The complexity scoring system establishes a framework in which other markers of complexity can be brought into the AECC as data become available. Some were tested in the costing study that led to the development of the AECC, but these have been set aside until these data can be collected routinely.