

Post-discharge risk stratification after AKI. An external validation and decision curve analysis of two risk models.

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Background and Aims:

There is limited evidence to inform which people should receive follow up after AKI and for what reasons. Here we report the external validation (geographical and temporal) and potential clinical utility of two complementary models for predicting different post-discharge outcomes after AKI. We used decision curve analysis, a technique that enables visualisation of the trade-off (net benefit) between identifying true positives and avoiding false positives across a range of potential risk thresholds for a risk model. Based on decision curve analysis we compared model guided approaches to follow up after AKI with alternative strategies of standardised follow up – e.g. follow up of all people with AKI, severe AKI, or a discharge eGFR<30.

Methods:

The Alberta AKI risk model predicts the risk of stage G4 CKD at one year after AKI among those with a baseline GFR≥45 and at least 90 days survival (2004-2014, n=9973). A trial is now underway using this tool at a 10% threshold to identify high risk people who may benefit from specialist nephrology follow up. The Aberdeen AKI risk model provides complementary predictions of early mortality or unplanned readmissions within 90 days of discharge (2003, n=16453), aimed at supporting non-specialists in discharge planning, with a threshold of 20-40% considered clinically appropriate in the study. For the Alberta model we externally validated using Grampian residents with hospital AKI in 2011-2013 (n=9382). For the Aberdeen model we externally validated using all people admitted to hospital in Grampian in 2012 (n=26575). Analysis code was shared between the sites to maximise reproducibility.

Results:

Both models discriminated well in the external validation cohorts (AUC 0.855 for CKD G4, and AUC 0.774 for death and readmissions model), but as both models overpredicted risks, recalibration was performed. For both models, decision curve analysis showed that prioritisation of patients based on the presence or severity of AKI would be inferior to a model guided approach. For predicting CKD G4 progression at one year, a strategy guided by discharge eGFR<30 was similar to a model guided approach at the prespecified 10% threshold (figure 1). In contrast for early unplanned admissions and mortality, model guided approaches were superior at the prespecified 20-40% threshold (figure 2).

Conclusion:

In conclusion, prioritising AKI follow up is complex and standardised recommendations for all people may be an inefficient and inadequate way of guiding clinical follow-up. Guidelines for AKI follow up should consider suggesting an individualised approach both with respect to purpose and prioritisation.