Introduction and Aims: It is important for nephrologists to have a clear understanding of their haemodialysis populations, the proportions using each of the various haemodialysis vascular access methods, and the rate of adverse complications such as bloodstream infection. With a view to enabling a structured quality improvement approach to haemodialysis vascular access system performance, we developed a simple, clinically practical model, using bacteraemia as the outcome of interest.

Methods: Our renal service serves a population of approximately 1.6 million, with a prevalent HD population of approximately 600 patients attending 7 outpatient HD centres. Using the unit electronic patient record we collected data on the haemodialysis population size, vascular access method prevalence, and staphylococcal bloodstream infection events within the period 01/04/2011 to 31/03/2014. The cumulative number of bacteraemic episodes could then be combined with the exact number of cumulative haemodialysis days patients were exposed, for each vascular access method to generate an event rate expressed as the number of staphylococcal bacteraemic events per 1,000 HD vascular access-exposed days.

Results: A model was designed to predict the cumulative total of staphylococcal bacteraemic events within a specified time frame (Figure). Populating this model allowed us to project the impact of changes in the haemodialysis population size, different arteriovenous access prevalences, and interventions that reduced bacteraemic events. For example, implementing changes to the proportions of patients using the different HD vascular access methods, whilst keeping the average HD population size and staphylococcal bacteraemia rates for each access type constant, allowed projection of the impact of these changes on the expected burden of staphylococcal bacteraemia over 1-year projections (Table).

Conclusions: The applicability and efficacy of the suggested model in predicting rates of vascular access related infections provides a useful structure in determining systems performance retrospectively and prospectively. With regard to future planning, the proposed model can be used to streamline processes of care so that can figure out where issues are that require attention, optimize resource allocation, and has the potential to reduce costs.