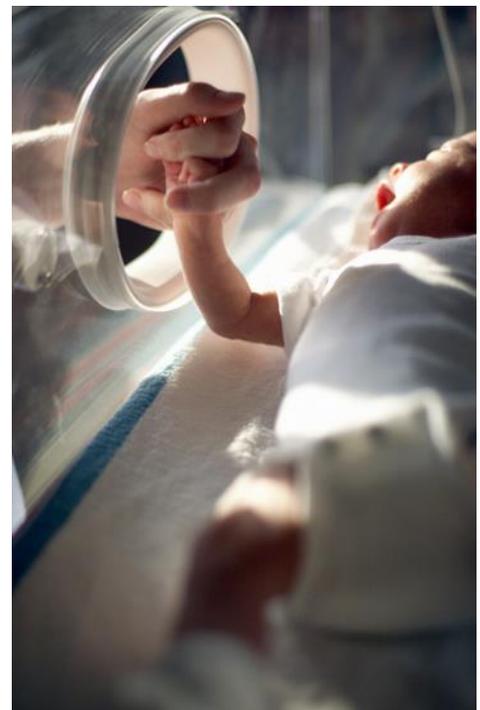


Planning neonatal capacity across a network of hospitals: centralisation vs. localisation

Summary:

A simulation model has been built that allows alternative configurations of neonatal services to be evaluated. The model incorporates four levels of care, each requiring a different intensity of nursing. The model mimics the normal variation in the number births and care requirements of the infants and monitors the distance from home to point of care. The model looks for the closest available cot, taking into account both infant needs and current neonatal workload (units become closed to new admissions when workloads exceed a given level).

One aspect of the model has been to examine the tension between centralisation and localisation of services. As units are merged in the model the variation in workload at the remaining units is reduced and less spare capacity is needed to cope with uneven workload. Resources may therefore be used more efficiently. This efficiency gain is, however, accompanied by a significant impact on parents; travel distances and the number of parents living more than one hour drive away from the point of care are significantly increased.



Context:

Neonatal services are a specialist service; services are commissioned and care is delivered across a network of hospitals. Capacity planning cannot be performed effectively at a single hospital since changes in the capacity of one hospital affects demand in the other hospitals in the network. Our aim was to develop a capacity/demand model that helped analyse provision of services across a network. The model looks at the ability of individual hospitals and the network to meet demand, the expected level of resource utilisation and the distance of parents from the point of care of their infant.

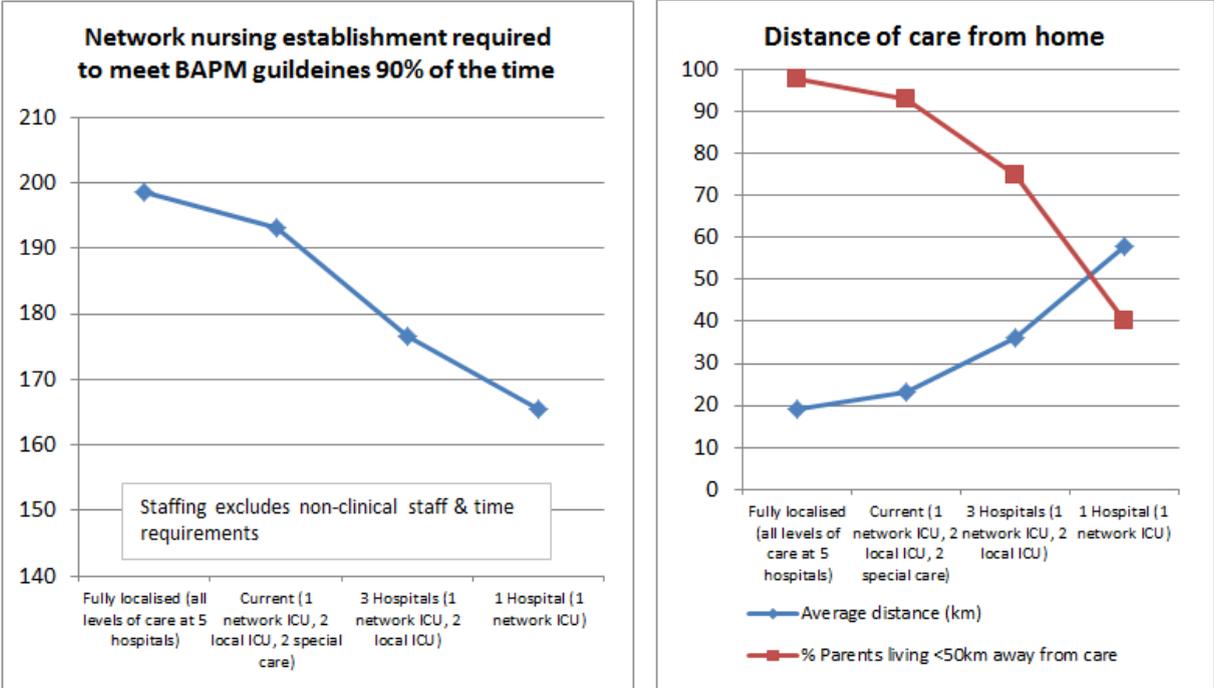
Method:

A simulation model was built, coupled to travel distances and times from home locations to points of care. Infants were categorised into seven groups depending on the level of maturity at birth, or the

need for specialist services (cardiac and surgical care). The requirement for different types of care (intensive, high dependency, special, transitional) and the length of stay in each level of care was sampled from distributions for each infant category. The model then searched for the closest cot to home, where the unit is equipped to provide the care needed and where the unit is not closed due to excessive workload at the time. Workload takes into account both the number of infants and the nurse requirements for different levels of care.

Outputs:

The model was used to examine a range of scenarios between full localisation (all services available in all hospitals) and full centralisation (services only available in one hospital). These extremes, while not being viable options, help provide the boundaries to the performance of the system. In order to meet the nurse staffing guidelines for neonatal care 90% of the time, it is predicted that nurse establishment (excluding supernumery and non-clinical staffing requirements) ranges from 200 at fully localised to 166 at fully centralised. This change is however accompanied by a very significant impact on parents; when services are fully localised, 98% of parents are within a 1 hour drive of the point of care but when services are fully centralised only 40% of parents are within an hours drive.



Discussion:

The model allows for the analysis of a complex system of care, where hospitals cannot plan independently of each other. Impact on parents is also evaluated allowing a balanced view of potential hospital efficiency against parent travel times. There is a real tension between centralisation and localisation. In such cases, it is important to model the impact to both hospital and patient (or parent).

Contact and more information:

For further information please contact Dr Mike Allen (Senior Research Fellow) m.allen@exeter.ac.uk