

An edited version of this article has been published as: Jones R (2012) Maternity bed occupancy: all part of the equation. Midwives magazine Issue 1: 2012. Please use this to cite.

Maternity bed occupancy: all part of the equation.

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The recent rise in births in the UK has placed some maternity units under considerable strain and may have led to the unfortunate situation where high occupancy may be contributing to sub-standard care or, at the very least, to sub-standard levels of service. A recent series of articles have highlighted the importance of maintaining a correct level of occupancy to support efficient and safe acute care (Jones 2009a-b, 2011a-b) and this article investigates the relationship between size and occupancy in maternity units.

The Erlang equation helps planners in any number of industries to calculate the number of service points (check-outs, telephones, beds, etc) where the arrival rate (admissions) and average service time (length of stay) are known. This equation also calculates the proportion of time that the service (a bed) will not be available for the next arriving customer (expectant mother). This is called the turn-away, i.e. when there are no available beds the person must be sent elsewhere to receive their care. Due to the 24/7 nature of midwifery the Erlang equation gives answers which are very close to the real world.

Figure 1 presents the number of available beds and reported occupancy levels in maternity units across England for both the last quarter (January to March) of 2010/11 and the first quarter (April to June) of 2011/12. Each maternity unit will therefore have two data points (except in a few cases of poor data reporting) reflecting changes in bed availability and occupancy over time.

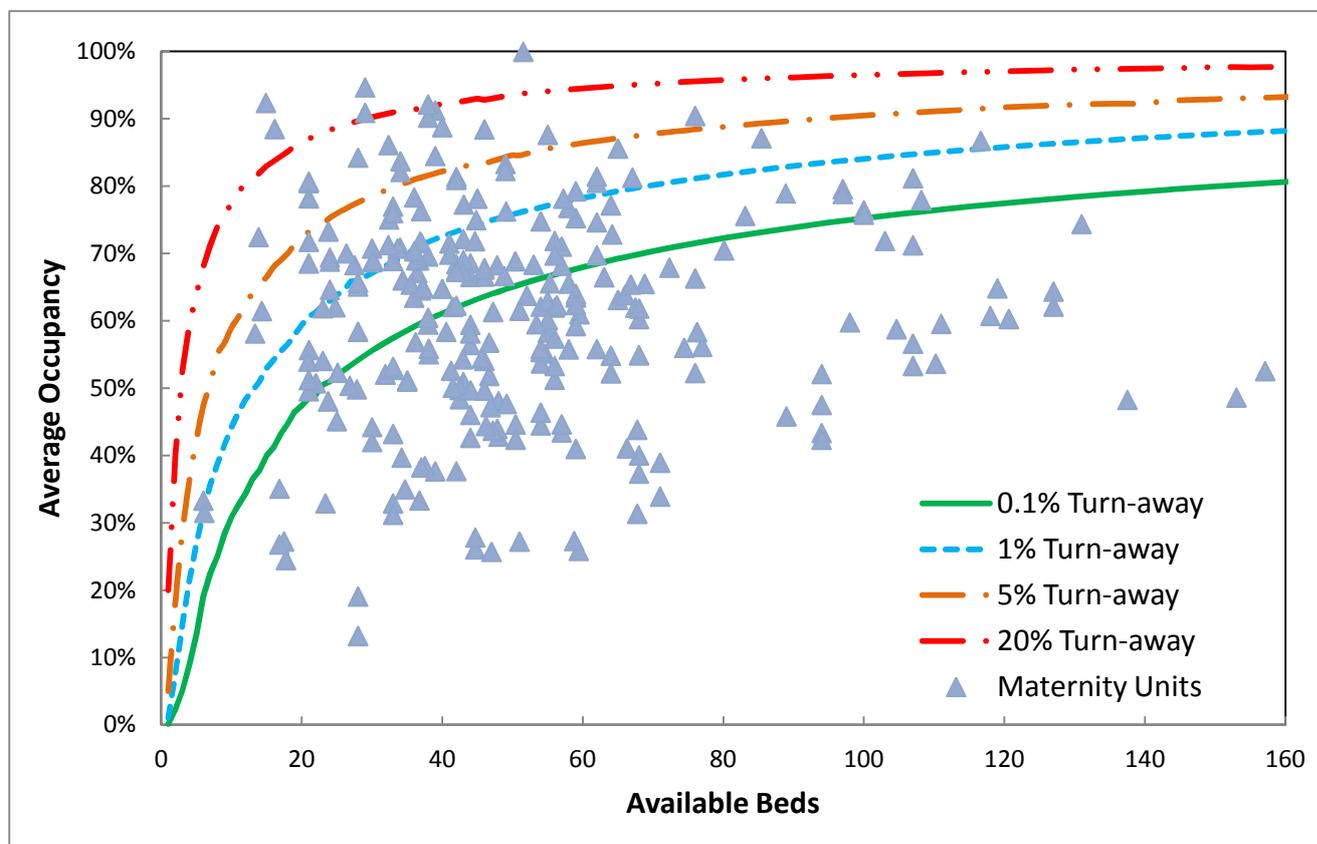
Super-imposed on the data are lines of constant turn-away as calculated by the Erlang equation (Jones 2001a). A maternity unit will have sufficient beds when it is operating below 0.1% turn-away; although below 1% turn-away is tolerable. A figure of 0.1% turn-away implies that on 1 in 1,000 occasions a bed is not available for the next arriving expectant mother. As turn-away increases operational 'chaos', inefficiency and even adverse events begin to occur with increasing frequency as the unit operates at 100% occupancy for increasing periods of time (Jones 2011a).

As can be seen the bulk of maternity units appear to be operating below the 0.1% turn-away line and if the data is taken at face value some could even operate with slightly fewer beds and still give a

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perfectly safe and high standard of service (subject to correct staffing levels and anticipated future growth).

Figure 1: Average occupancy for maternity units in England



Footnote: Data is for each maternity unit is form the 4th quarter of 2010/11 and the 1st quarter of 2011/12 and was obtained from http://www.dh.gov.uk/en/Publicationsandstatistics/Statistics/Perfomancedataandstatistics/Beds/DH_083781

It has been assumed that NHS Trusts have correctly reported available and occupied beds. The data point at 100% occupancy looks to be reporting error. Hospitals with more than one maternity unit have had the number of available beds adjusted and a number of gross reporting errors have been removed but reported occupancy for some units still appear to be too low to be correct.

However it is the cluster of 35 hospitals operating above 1% turn-away which represent instances of potential concern. A further 30 hospitals lie between the 0.1 and 1% turn-away lines, i.e. they are in danger of providing a poor service should the number of deliveries increase any further. It is apparent from Figure 1 that all large maternity units (>100 beds) are generally operating with a comfortable occupancy margin but it is the units with fewer than 60 beds where the greatest problems appear to lie.

Provided the data is accurate, it is suggested that all of the hospitals operating above 1% turn-away, at the very least, need to increase the number of available beds to bring occupancy to an acceptable level. While the full compliment of staff may not be available it is probably the lesser to two evils to expand the number of beds first and then to recruit staff next since the chaotic situation created by too few beds will only exacerbate the effect of any staff shortages.

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The next point of relevance is the absolutely flawed assumption behind the one-price-for-all-sized-units represented by the HRG tariff (Jones 2009a). Figure 1 demonstrates how size and occupancy are inter-linked and that larger maternity units can operate at higher average occupancy. The tariff is calculated at the national average and hence the point at which the average costs for maternity HRG will be determined is for units having around 59 beds and 61% average occupancy, i.e. roughly at the 0.1% turn-away point for 59 available beds. Hence due to the unavoidable lack of economy of scale, smaller units will experience cost pressures due to the flawed assumptions within the tariff and those with more should be able to make a profit which will increase with size.

It should be appreciated that one-size-fits-all solutions just do not work in the real world of health care and especially in maternity.

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