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Emergency department performance and inpatient bed occupancy

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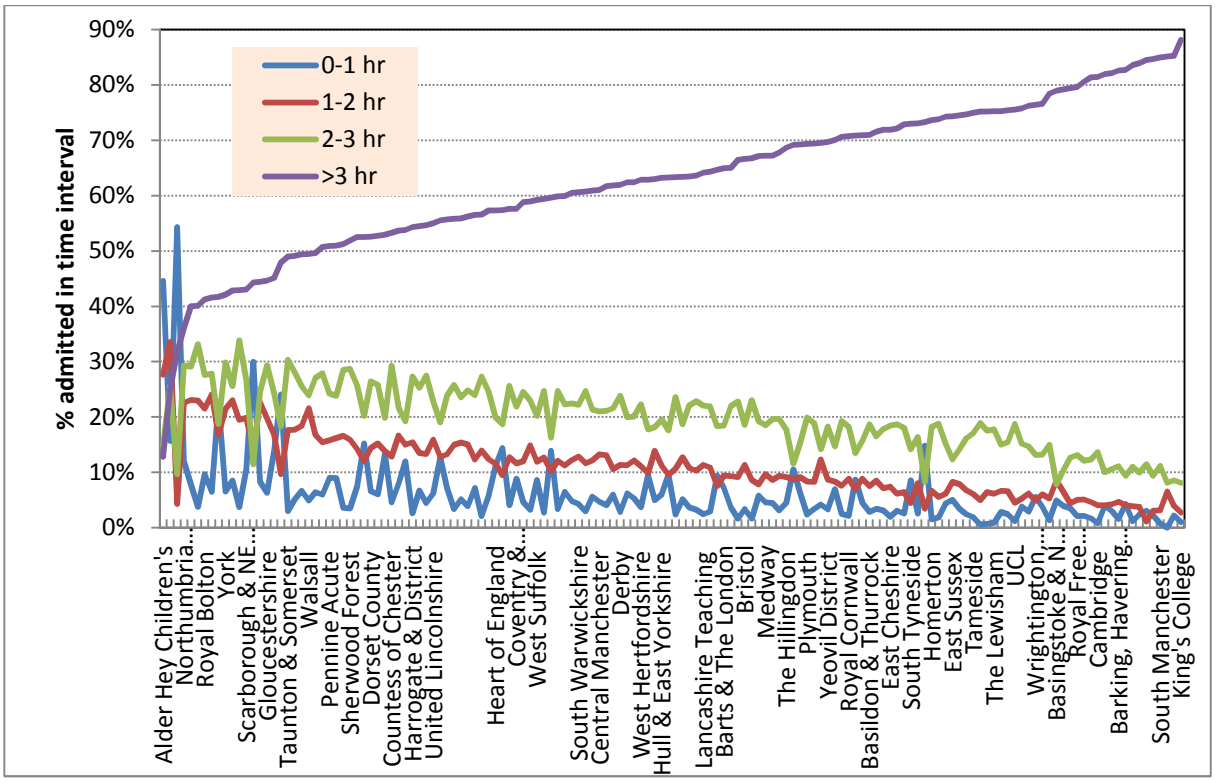
Key Words: health service planning, A&E, Emergency department (ED), performance measures, capacity, optimum efficiency, bed occupancy, delays to admission, England, NHS, four hour target

An accompanying article in this edition of BJHCM presents a framework within which to understand hospital bed occupancy and the deleterious consequences arising out of too high occupancy (Jones 2011b). In this respect high inpatient bed occupancy is an internationally recognised factor regulating the delays to admission experienced within the emergency department (Lattimer et al 2004, Rathlev et al 2007, Hoot & Aronsky 2008, Hoot et al 2008, Hillier et al 2009, Khare et al 2009, Lucas et al 2009, Moskop et al 2009). A previous article in BJHCM has demonstrated how the imposition of an arbitrary four hour A&E target in England led to a cascade of unintended counting and financial consequences as hospitals struggled to achieve an unattainable target (Jones 2011a).

Figure 1: Time to admission for English accident and emergency departments



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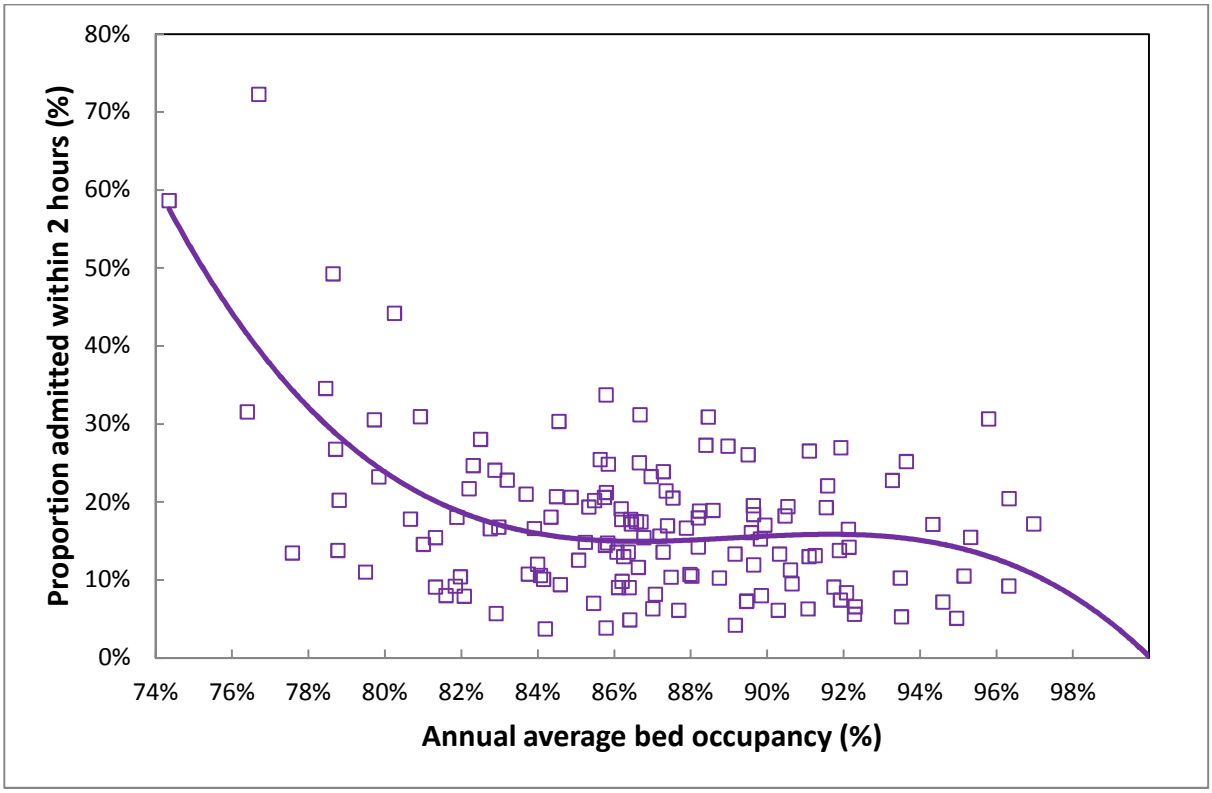
The recent performance of English A&E departments regarding delays to admission is given in Fig. 1 where it can be seen that there is a wide range in the proportion of admissions where the delay is greater than three hours and that long delays are totally exclusive of admission within shorter times. Admissions within 0-1 hours appear to be a mirror image of 2-3 hours but not 1-2 hours, i.e. these two time bands are interlinked.

Figure 2: Bed occupancy and the ability to rapidly admit patients



Footnote: For Fig 1 & 2 data from 2009/10 for A&E is from http://www.hesonline.nhs.uk/Ease/servlet/ContentServer?siteID=1937&categoryID=1502 and bed occupancy (Beds Open Overnight) http://www.dh.gov.uk/en/Publicationsandstatistics/Statistics/Performancedataandstatistics/Beds/DH_083781

Fig. 2 re-interprets this data by comparing the ability to admit within 2 hours against the annual average inpatient bed occupancy at each hospital. As can be seen there is a direct linkage between bed occupancy and the proportion of rapid admissions and that rapid admission can only occur when occupancy starts to fall below 85% and more specifically below 80%. The point at which all patients are admitted within 2 hours occurs somewhere around 70% average occupancy while at the upper end of the range the ability for rapid admission drops to zero at 100% occupancy.

The high scatter around the trend line can be explained by the fact that we are dealing with annual averages, hospitals with a different mix of inpatient specialties and hospitals of different size. Hospitals with larger and/or less complex bed pools generally lie above the trend line (better performance) while the ones with smaller bed pools lie below . The plateau at around 15% of admissions within 2 hours most probably arises during the summer months when the weekly average occupancy, especially in the medical specialties, is much lower than the annual average.

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What conclusions can be reached from the above? Firstly, never implement targets when the key physical resources to achieve those targets are not in place. Poor process efficiency within A&E may make a bad situation worse but there comes a point when processes have been optimised and it is bed availability which determines performance. Secondly, the message is fairly obvious; the smooth running of the emergency department in terms of ability to rapidly admit patients is seriously constrained for all but a handful of English hospitals. A move to the European average occupancy of 77% or the US average of less than 80% in hospitals with less than 1,000 beds is the only way in which high standards of care and operational efficiency can be delivered. These results confirm the assertion that average occupancy in UK hospitals is simply far too high to sustain operational and medical efficiency (Jones 2011b). You simply cannot escape the mathematical and operational realities explained by queuing theory.

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