An edited version of this article has been published as: Jones R (2017) ***British Journal of Healthcare Management*** 23(5): 239-240. Please use this to cite.

In-hospital deaths, all-cause mortality and medical admissions

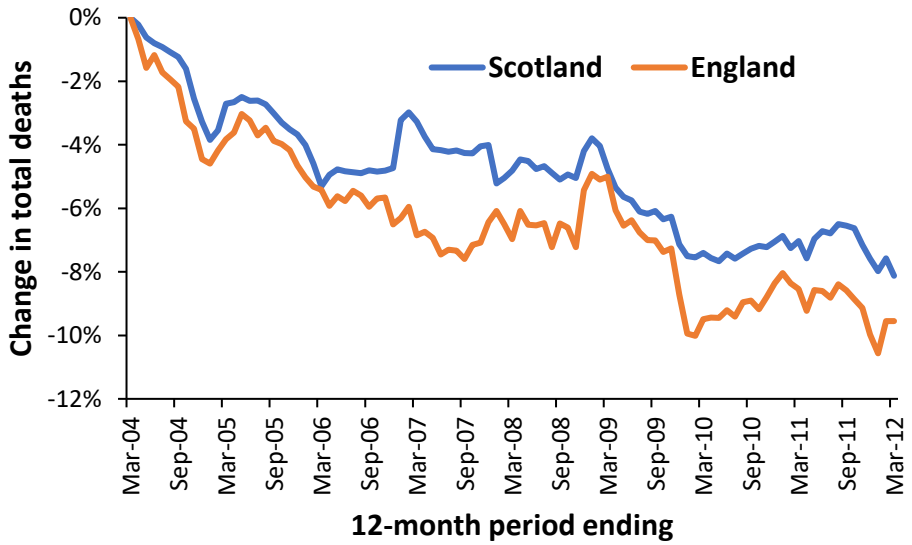
Dr Rod Jones (ACMA, CGMA)
Statistical Advisor
Healthcare Analysis & Forecasting, Worcester
hcaf_rod@yahoo.co.uk

Details of further articles in this series are available at: www.hcaf.biz and at www.hcaf.biz/2010/Publications_Full.pdf

The original can be obtained from www.bjhcm.co.uk using an NHS Athens login.

The end-of-life is preceded by a period of declining self-rated health (Stenholm et al 2015). Primary care and nursing home costs generally rise with an average of 6-years of poor health before death (McGrail et al 2000, Leadbeater & Garber 2010). Hospital costs increase 10-fold from 5 years prior to death to the last year of life, and this overshadows a 30% increase from 65 to 75 years (Seshamani & Gray 2003). Some 55% of a person's total hospital bed days occur in the last year of life (Hanlon et al 1998), and 87% of people are hospitalized at least once in the last year (Karamanidis et al 2007). Costs especially escalate in the last 22 weeks of life (Beeknoio & Jones 2016).

Figure 1: Running (moving) 12-month total deaths in England and Scotland relative to 2003/04



Footnote: Monthly data for England is from Office for National Statistics and that from Scotland is from National Records of Scotland.

Hence it is the trend in total deaths rather than age-standardized mortality which is the key factor behind the number of in-hospital deaths and the marginal changes in medical admissions (Beeknoo & Jones 2016). For example, a recent study comparing differences in in-hospital mortality between England a Scotland noted that both elective and emergency mortality rates decreased faster in England than Scotland (Aragon & Chalkley 2014). Figure 1 shows that over the same time as the

An edited version of this article has been published as: Jones R (2017) ***British Journal of Healthcare Management*** 23(5): 239-240. Please use this to cite.

University of York study, total deaths (all-cause mortality) in England decreased faster than Scotland. It is therefore a moot point if the change in in-hospital mortality rate in both countries was primarily driven by changes in patient care (Jones 2015b).

The next key finding is that changes in total deaths are a mirror image of the marginal changes in hospital bed occupancy (Beeknoo & Jones 2016), which is largely driven by medical admissions. Given that bed availability has been a huge issue in the NHS during the winter of 2016/17 it is useful to see if local trends in deaths can inform hospitals of likely marginal changes in bed demand. To this end, Figure 2 shows the running (moving) 12-month total of deaths relative to the minimum for eight London local authority areas from the year ending Dec-01 through to the 12-month period ending Feb-17. As for Scotland and England (Figure 1) total deaths show an initial trend downward arising from an overall increase in life expectancy.

However, along this trajectory there are periods when deaths are much higher for 12-month periods. Note that saw-tooth features in a running (moving) total denote on/off switching leading to high/low behaviour. For example, in Lewisham for the 12-months commencing Aug-07, in Lambeth commencing Dec-07, and in Brent commencing Jul-14. However, Lewisham apparently avoids higher deaths during the winter of 2016/17. Also note that deaths during the winter of 2016/17 show highly variable increases depending on the local authority, with Brent being the worst affected.

Hospitals servicing these local authority areas will therefore experience variable bed pressures. Lewisham hospital has an almost exclusive flow from the residents of Lewisham. The residents of Brent being closest to Central Middlesex and Northwick Park hospitals. Central Middlesex also has a large flow from residents of Ealing, while Northwick Park has its main flow from Harrow. Hence pressures at each hospital will be a composite picture derived from respective patient flows (Jones 2015a). The actual situation will be somewhat modified by ambulance flows, as ambulances are diverted to less busy hospitals. Lewisham probably experienced bed pressures during the winter of 2016/17 due to increased flows from patients who would otherwise have gone to nearby hospitals.

It is also important to recall that these surges in death overwhelm the resources of respective social care agencies, in that they are having to deal with an unexpected increase in persons in the last year of life with associated demands for nursing home and in-home assistance.

In conclusion, every CCG, local authority and hospital needs to monitor trends in total deaths and in-hospital deaths as an indicator of periods of anticipated higher demand. The apparent cause of these surges in deaths seems to be an infectious agent, however, this awaits confirmation (Jones 2015c).

References

Aragon M, Chalkley M (2014) Understanding the differences in in-hospital mortality between Scotland and England. Centre for Health Economics, University of York. https://www.york.ac.uk/media/che/documents/CHERP104_hospital_mortality_Scotland_England.pdf

Beeknoo N, Jones R (2016) The demography myth - how demographic forecasting underestimates hospital admissions, and creates the illusion that fewer hospital beds or community-based bed equivalents will be required in the future. Brit J Med Medical Res 19(2): 1-27.

Hanlon P, Walsh D, Whyte B, et al (1998) Hospital use by an ageing cohort: an investigation into the association between biological, behavioural and social risk markers and subsequent hospital utilization. J Public Health Med 20(4): 467-476.

Jones R (2015a) Unexpected and Disruptive Changes in Admissions Associated with an Infectious-like Event Experienced at a Hospital in Berkshire, England around May of 2012. Brit J Med Medical Res 6(1): 56-76. doi: 10.9734/BJMMR/2015/13938

Jones R (2015b) A 'fatal' flaw in hospital mortality models: How spatiotemporal variation in all-cause mortality invalidates hidden assumptions in the models. FGNAMB 1(3): 82-96. doi: 10.15761/FGNAMB.1000116

An edited version of this article has been published as: Jones R (2017) ***British Journal of Healthcare Management*** 23(5): 239-240. Please use this to cite.

Jones R (2015c) Recurring Outbreaks of an Infection Apparently Targeting Immune Function, and Consequent Unprecedented Growth in Medical Admission and Costs in the United Kingdom: A Review. Brit J Med Medical Res 6(8): 735-770. doi: 10.9734/BJMMR/2015/14845

Karamanidis K, Lim K, DaCunha C et al (2007) Hospital costs of older people in New South Wales in the last year of life. Med J Aust 187(7): 383-386.

Leadbeater C, Garber J (2010) Dying for change. Demos, London. https://www.demos.co.uk/files/Dying_for_change_-_web_-_final_1_.pdf

McGrail K, Green B, Barer M, et al (2000) Age, costs of acute and long-term care and proximity to death: evidence for 1987-88 and 1994-95 in British Columbia. Age & Ageing 29: 249-253.

Sheshamani M, Gray A (2003) A longitudinal study of the effects of age and time to death on hospital costs. J Health Econ 23(2): 217-235.

Stenholm S, Kivimaki M, Jylha M, et al (2015) Trajectories of self-rated health in the last 15 years of life by cause of death. Eur J Epidemiol. Doi: 10.1007/s10654-015-0071-0

An edited version of this article has been published as: Jones R (2017) ***British Journal of Healthcare Management*** 23(5): 239-240. Please use this to cite.

Figure 2: Running (moving) 12-month total deaths in various London local authority areas