Original Article

The way healthcare is funded is wrong: it should be linked to deaths as well as age, gender and social deprivation

RP Jones & J Kellett

Abstract

Background: *most spending on health occurs in the last few months of life. This study explored the number of deaths in England and their relationship to healthcare funding.*

Methods: *post hoc analysis*

Results: *the number of deaths range from 3.3 to 15.1/1000/year, and the number of deaths per general practitioner from 5.2 to 27.3/year. Hospital deaths range from 12 to 52/1000 admissions. The correlation between the allocation index used for funding and deaths is not perfect and suggests that some regions may get up to17% less and others 14% more funding than is equitable.*

Conclusion: *there is considerable variation in the prevalence of death throughout England. If healthcare funding considered the local number of deaths it would be more equitable.*

Keywords

health service funding, mortality, health service delivery

Key points

- There is considerable variation in the prevalence of death in different regions of England.
- If healthcare funding was based more on the number of deaths, rather than just on the age, gender, social deprivation and other factors, it would be more equitable.

Background

Healthcare, and acute hospital services in particular, are under increasing pressure. The received wisdom is that this is because of the ageing population.[1, 2] People over 85 years old now account for 25% of bed days and spend around eight days longer in hospital than those under 65.[3] However, is this longer length of stay and demand on the hospital services solely the result of age?[4] Currently it is unclear if longevity will increase the costs of healthcare because there will be more morbidity (i.e. the "failure of success" theory),[5] or reduce costs because people will live longer healthier lives with a limited period of illness at the end of life (i.e. the "compression of morbidity" theory),[6] or there will be a "dynamic equilibrium" where morbidity increases due to rising levels of chronic conditions and disabilities amongst the older population while serious disability would decrease.[7]

The most intense spending on acute health care in a lifetime occurs in the last few months of life.[8-13] Healthcare costs of a population, therefore, are intimately linked to its death rate and not its age, an assertion that has been confirmed by studies from the USA,[8,9,14] the Netherlands,[15] Switzerland[16] and England.[17] The exact cost will depend on the cause of death: cancer is more expensive than organ failure,[18] and frailty and dementia incur considerable nursing home costs.[10] In the developed world life expectancy has increased and those who are dying are, therefore, older than they used to be. This does not necessarily mean that it should be more difficult or expensive to care for the dying than it was. In this study we explored the number of deaths in different regions of England and their relationship to healthcare funding.

Methods

Study design: post hoc analysis of healthcare data in the public domain.

Data sources: for the purpose of healthcare funding England is divided into approximately 200 Clinical Commissioning Groups (CCGs) that serve approximately 250,000 people. Mid-year estimates for CCG populations and annual deaths were obtained from the Office for National Statistics.[19] Deaths and population in UK local government areas for 2016 were also obtained from the Office for National Statistics.[20] In-hospital deaths (including deaths within 30-days of discharge) per admission (averaged over five years, 2013 to 2017) in English NHS hospitals were obtained from

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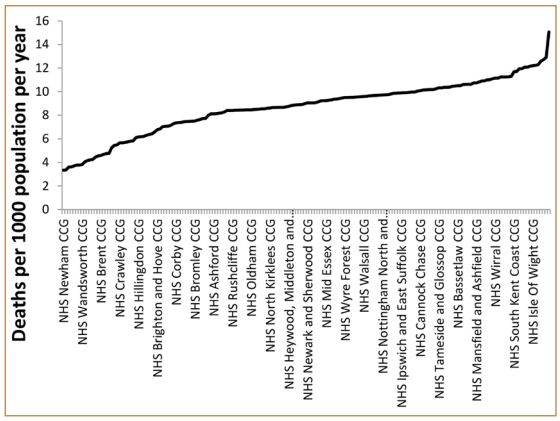


Figure 1. Deaths per 1000 population per year for each Clinical Commissioning Group in England

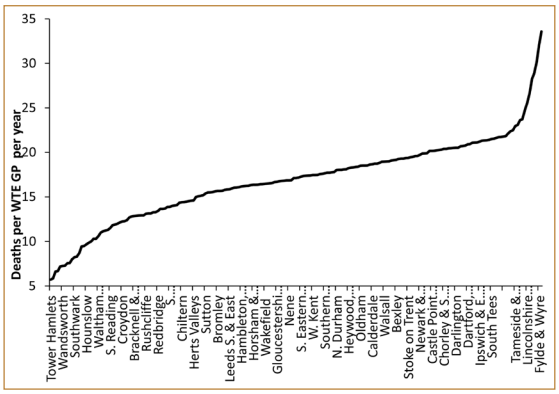


Figure 2. Deaths per whole time equivalent (WTE) general practitioner (GP) per year for each Clinical Commissioning Groups in England

the NHS Digital website using the Summary Hospital-level Mortality Indicator data series.[21] The number of whole-time equivalent (WTE) General Practitioners (GP) working in each CCG as at December 2017 was obtained from NHS Digital General and Personal Medical Services, December 2017.[22] Deaths per GP in CCGs were calculated as the average of deaths in 2015 and 2016[23] divided by the WTE GP count at December 2017.[22] CCG financial position against budget for the third quarter of 2017/18 was obtained from NHS England[24] *Allocation weighting:* population weighting for general and acute services (hospital acute inpatient, emergency department and outpatient services) and the Market Forces Factor for CCGs used to calculate the General and Acute Needs Index (GANI) and the formulae to calculate it was obtained from NHS England.[25] GANI is the weighted allocation formula used to award funds per head of population to different CCGs. Therefore, if a CCGs is awarded a GANI of 0.60 funding will be 60% of a CCG with a GANI of 1.00.

Statistical analysis: all statistics, including ordinary linear regression, were calculated using Microsoft Excel.

Ethics: ethical approval was not required

Funding: this study was entirely funded by the authors

Results

The number of deaths per year in a CCG range from 3.3 per to 15.1 per 1000 (Fig 1), and the number of deaths per year cared for by each whole time equivalent general practitioner ranges from 5.2 in the City of London and Hackney to 27.3 in Thanet (Fig 2) . Deaths per thousand admissions to hospital range from 12 deaths at Homerton University Hospital to 52 deaths at St Mary's Hospital in the Isle of Wight (Fig 3).

The General and Acute Needs Index (GANI), the weighted allocation formula used to award funds per head of population to different CCGs, also varies according to location, ranging from 0.64 for Tower Hamlets to 1.30 for South Tyneside (Fig 4). There is a linear relationship between GANI and the number of deaths in each CCG, however the "scatter" increases as the number of deaths per 1000 population per year increases (Fig 5), ranging from

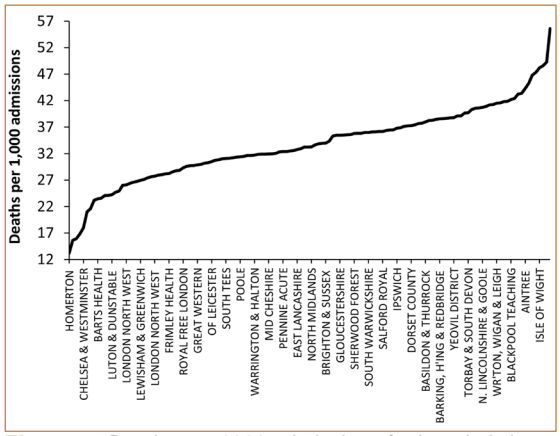


Figure 3. Deaths per 1000 admissions for hospitals in England (includes deaths within 30-days of discharge)

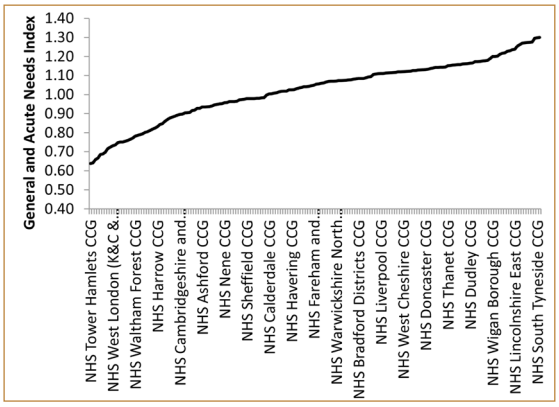


Figure 4. General and Acute Needs Index awarded to different Clinical Commissioning Groups in England in 2018-19.

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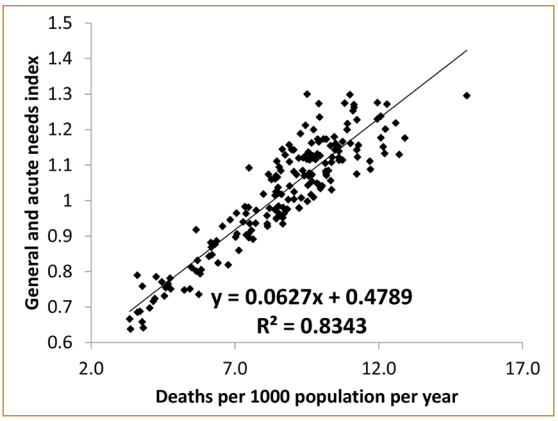


Figure 5. Correlation between the General and Acute Needs Index and deaths per 1000 population per year in each Clinical Commissioning Group in England

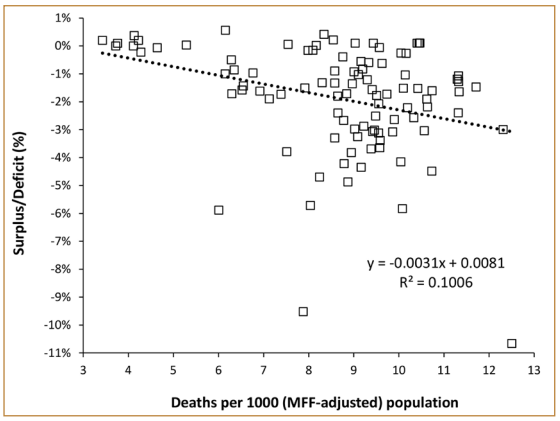


Figure 6. Correlation between 2017/18 Q3 CCG financial position (Surplus/Deficit) and deaths per 1000 (MFF-adjusted) population.

-17% for Knowsley to +14% for Richmond (Table 1). Moreover, CCGs with a high number of deaths have higher fiscal deficits (Fig 6). Eighty of 180 CCG's who reported their fiscal deficits for 2017/18 implausibly claimed to be in perfect fiscal balance. However, of the 80 CCG's reporting a fiscal deficit only two had less than 6 deaths per 1000 population per year, and more than half had over 9 deaths per 1000 per year.

Discussion

This study shows that there is considerable variation in the prevalence of death, the major driver of healthcare costs, in different regions of England. It proposes that healthcare funding, which currently ignores the raw mortality rate, should be based more on the number of deaths, rather than just on the age, gender, and social deprivation.

Our findings are based on novel interpretation of data that is freely available in the public domain, which is in large part collected because it is required to calculate complex weighted allocation funding formulae that are based on the received wisdom that healthcare costs are largely driven by age, gender, social deprivation and other factors such as specific diagnoses etc. The mechanisms used are extremely complex (e.g. the formulae for revenue allocations to Clinical Commissioning Groups have a 57 page technical guide),[26] and currently ignore the importance of the absolute number of deaths in any location. Although the distribution of funds using these methods broadly corresponds to local death rates, there is considerable scatter: some regions may get over 10% more and some 10% or less funding per death. We propose that linking funds to the number of deaths would be a simpler, fairer and more transparent means of funding allocation for the end-of-life part of total acute costs. Death, unlike the numerous complex and abstract indices and assumptions used by weighted allocation formulae, is an easily measured, objective and incontrovertible fact.

No one should doubt that conscientious general practitioners that have to care for five times as many dying patients per years as their colleagues elsewhere will have an increased workload. Similarly there is a huge difference in the number of deaths per 1000 admission in UK hospitals, ranging from 12 per 1000 at Homerton University Hospital to 55 per 1000 in the Isle of Wight. Although hospital mortality rates

Table 1. Clinical Commissioning Groups with a General and Acute Needs Index (GANI) that most differ from the linear regression correlation shown in Figure 5 (see text).

Clinical Commissioning Groups	Difference from linear regression line
NHS Knowsley	-17.3%
NHS St Helens	-13.6%
NHS Blackburn With Darwen	-13.2%
NHS Halton	-11.6%
NHS Chorley and South Ribble	-10.8%
NHS Barnsley	-10.8%
NHS North Tyneside	-10.8%
NHS Bradford City	-10.7%
NHS Stockport	-10.5%
NHS South Tyneside	-10.0%
NHS Herefordshire	10.1%
NHS Brighton and Hove	10.3%
NHS Nottingham West	11.5%
NHS Wandsworth	11.9%
NHS Hastings and Rother	12.9%
NHS Richmond	14.0%

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are still used by some to define clinical excellence,[27] it is far more likely that these differences are explained by diversity in the populations served by the hospitals than any variations in the quality of their care: the residents of the Isle of Wight are almost all retirees, whereas Homerton University Hospital cares for the young populations of Hackney and the City of London.

Many patients who die will spend their last months with significant dependency: not all dying patients need to be or should be admitted to hospital, as there may be better and possibly cheaper management alternatives such as hospice and community care. The number of patients dying in the Isle of Wight hospital, for example, might be reduced if there were more community and hospice services available. This would still require funding to be linked to the number of deaths. Our analysis shows that the data available implies that this is not happening, as areas with a high number of deaths have higher funding deficits (i.e. both hospital and CCG over-spends).

Cynics might argue that using the number of deaths to guide funding would incentivise clinicians to neglect their patients, as they will get more money if more of their patients die. It could also be argued that differences in the cost of living must also influence the cost of dying: death, for example, may be 17% cheaper in Knowsley on Merseyside and 14% more expensive in Richmond, the borough of London with the highest cost of living.[28] However, even when we made cost of living adjustments using the NHS Market Forces Factor for CCGs, we found that the amount of money awarded per death still varied considerably from region to region. The truth is that the exact costs of dying from different causes in different parts of England have not been adequately studied. The simple solution to all these issues is to have a national death registry and audit it. By relating funding to the number of deaths, additional adjustment will be required that account for the costs of different causes of death, and allocate funds according to how many deaths were from cancer, organ failure, or frailty and dementia etc.

Conclusion: there is considerable variation in the prevalence of death in different regions of England and current funding disadvantages those CCGs with the more deaths. If healthcare funding formula also included the number of deaths, which can be accurately measured, rather than just on the age, gender, social deprivation and other factors, it should be simpler, more equitable and less open to subjective adjustments based on opinions and assumptions.

Conflict of interest

Rod Jones is Statistical Advisor, Healthcare Analysis & Forecasting, Worcester, UK. John Kellett is a major shareholder, director and chief medical officer of Tapa Healthcare DAC.

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