

Infectious outbreaks and the capitation formula

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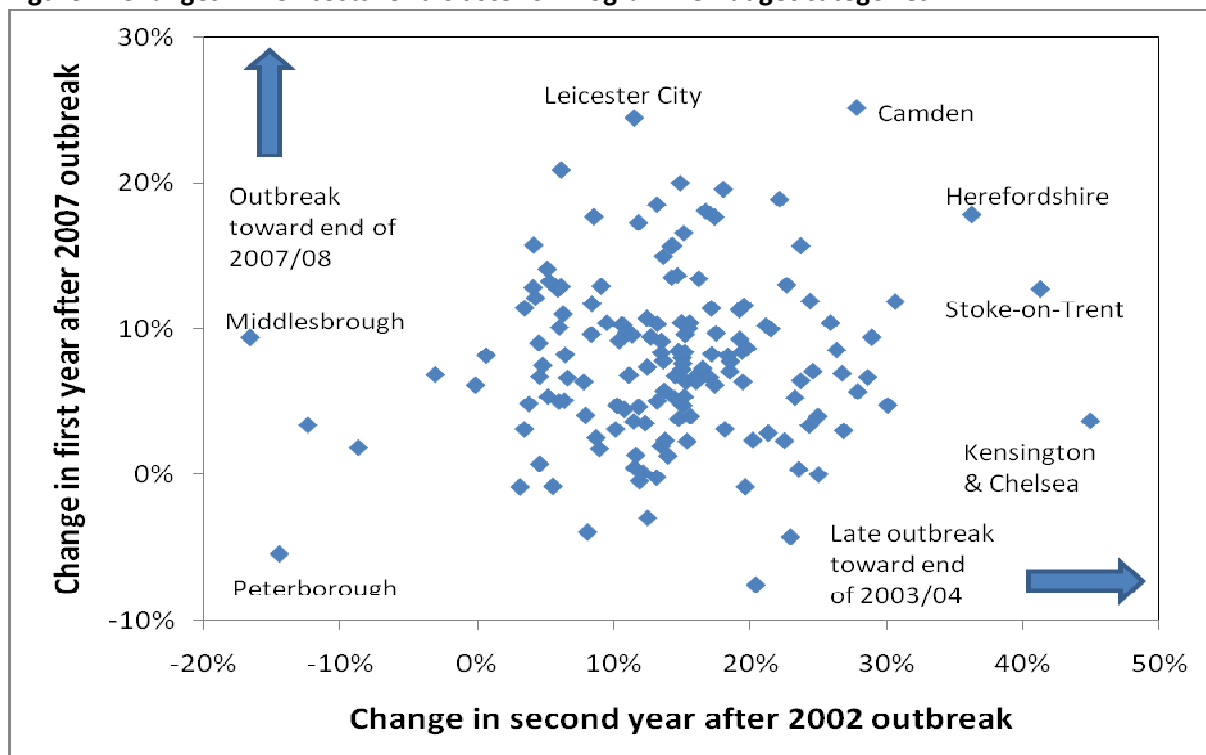
Abstract

A cyclic pattern in expenditure specific to a defined set of programme budget groups in English PCTs over the past six years has similarities to an infectious outbreak. The changes in expenditure also exhibit geographic granularity over time similar to that expected for an infectious disease outbreak. Over a six year period two outbreaks can be discerned and implications to the formula used to fund health care in England are discussed.

Key Words: capitation formula, health care costs, trends, NHS, England, infectious outbreak

The trends in PCT Programme Budget expenditure (i.e. the totality of expenditure across 23 groups based around the patient's diagnosis) have been recently analysed within the context of a possible outbreak of a new type of infectious disease (1). In this respect all infectious outbreaks show a degree of granularity in that some areas are worse affected than others and this largely seems due to the movement of infected persons from one location to another (2).

Figure 1: Changes in PCT costs for a cluster of Programme Budget categories



Footnote: Programme budget categories showing the characteristic shape over time at national level were used to form a group for which costs were derived. See Jones 2010 (1) for more details.

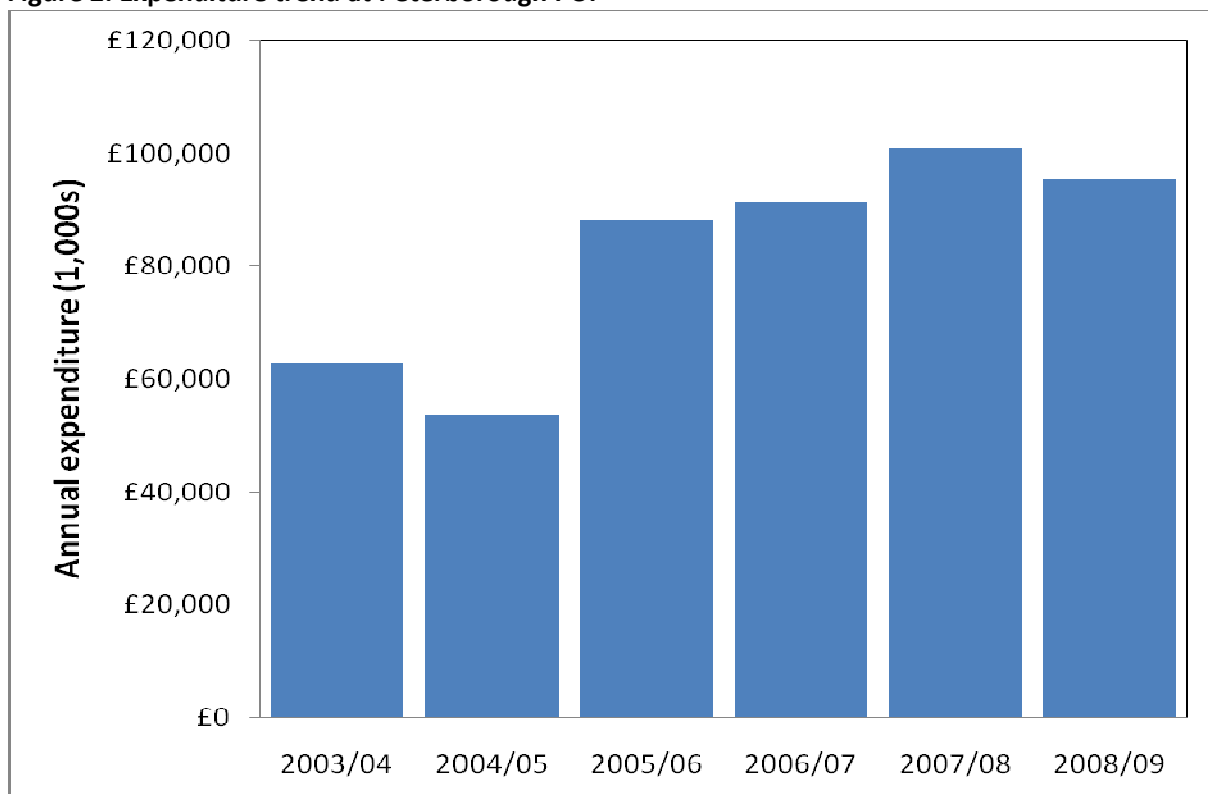
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A recent essay in the British Journal of General Practice has pointed out that the greatest weakness of the formula used to allocate money to Primary Care Trust (PCT) and GP commissioners in England was that it incorrectly assumed that the environment (weather patterns, etc) and infectious outbreaks play no part in the cost of health care (3,4), i.e. all healthcare costs are person- or socio-economic related (deprivation, etc).

It has recently been proposed that a previously uncharacterised type of infectious outbreak occurred in the UK in 2002 and 2007 (5-7). These outbreaks led to an increase in emergency admissions relating to a set of medical and mental health conditions and wider increases in primary care costs (1). The outbreak appears to show a high degree of granularity with an initial national outbreak followed by further local outbreaks as time progresses (1, 5-7). Programme budget costs represent the most comprehensive source of the totality of health care expenditure in England; however, this rich data source only commenced in 2003/04 which is the year after the proposed mid-2002/03 outbreak and only 2008/09 is currently available at the other end of the time period. Can we use this time-series to test the infectious outbreak theory and the related issue of granularity?

Figure 1 shows the change in costs experienced by English PCT's in the second year following the 2002 outbreak, hence, 2004/05 versus 2003/04 and first year following the 2007 outbreak, i.e. 2008/09 versus 2007/08. As can be seen an interesting pattern emerges which can be understood in relation to the timing of the outbreak in particular locations. PCT's such as Kensington & Chelsea, Stoke-on-Trent and Herefordshire experience the 2002 outbreak toward the end of the 2003/04 financial year and hence face the full financial impact in 2004/05. Leicester City and Camden appear to experience the full effect of the 2007 outbreak in 2008/09 implying an outbreak later in 2007/08, etc. The magnitude of the change seen on the two axes indicates the position relative to the initial outbreak. A more modest change will imply that the outbreak has occurred either in year one or year three and this would explain the time-dependant changes seen at national level which are the cumulative effect of the time-dependant spread at local level (1).

Figure 2: Expenditure trend at Peterborough PCT



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Toward the lower end of the chart we have Peterborough PCT which displays a negative change on both occasions. Figure 2 shows the pattern in expenditure over time for this particular PCT. The fascinating observation is that the pattern over time has been maintained but has been shifted by two to three years, i.e. the outbreak appears to occur two to three years later in this PCT. As can be seen a large step-change in costs occurs in 2005/06 and hence the outbreak must therefore have occurred at some point close to March of 2005 (to give a full-year cost effect) and it is anticipated that the 2007 outbreak will have reached this PCT in time to give a large step increase in 2009/10.

This appears to concur with other studies which the author has conducted in Essex where the outbreak appears to occur at different points in time in different locations. One PCT in Essex appeared to experience the outbreak in late 2008/09. This transition was seen as a step increase in emergency medical and geriatric admissions with a length of stay of two or more days, i.e. these are not trivial admissions due to emergency assessment activity (8).

The fact that the pattern of expenditure over time has been maintained tends to suggest that we are not dealing with something to do with the behaviour of the local acute hospital(s), i.e. the clear dip in expenditure which always occurs in the year before the outbreak. Indeed what we have is something similar to a cluster bomb effect – seemingly well run PCT's having just achieved a surplus suddenly experiencing 'unexplained' financial pressures. It is therefore not surprising to note that the Department of Health and the Strategic Health Authorities cannot understand this apparently bizarre pattern in cost behaviour.

For instance, Camden PCT experienced a repeat of a 25% increase and this must surely place this PCT in line for a special financial allocation based on the high cumulative impact, an issue which is entirely outside the scope of the current funding formula. At the present time such large increases in expenditure are usually blamed on someone (incompetent PCT managers or changes in the admission threshold at the local acute Trust, etc); which is unfortunately deflecting serious consideration away from the real issues. Hence one may assume that depending on which years data are used to prime the capitation formula it is conceivable that different answers regarding funding may arise.

How does this data fit with the alternative hypothesis based on acute efficiency leading to increased admissions (9)? There are several arguments against this hypothesis:

1. We are dealing with the totality of PCT expenditure not just acute
2. We are dealing with a defined set of diagnoses
3. Acute efficiency (and ability to admit) increases by increments and not large step changes
4. The effect is international in scope (10,11)
5. The pattern is also observed in accident and emergency department attendance which is outside the scope of control of acute hospitals (12)

At GP practice level the issues become even more complex. My own studies show that the infectious outbreak shows high granularity even within the geographic boundary of a single PCT where virtually all patients are treated at a single acute site. This type of behaviour is inconsistent with the hypothesis that the effect is due to acute behaviour.

So while this article has not categorically proved that there is an infectious outbreak leading to profound financial impact it will hopefully stimulate further studies including the issue of how health care expenditure may be behaving over time. Indeed if these observations are correct then the propensity of this new disease to travel somewhat slowly suggests a set of unique infectious characteristics including the mode of transmission. Having studied the data on hospital admissions for seven countries in total (Canada, USA, UK plus four others) I am of the opinion that this is indeed

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a new infectious disease of profound international significance – indeed one which is going to fundamentally change how we view many things including issues of fair funding to population groups such as GP commissioning groups.

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