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Are emergency admissions contagious?

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Abstract

Unexpected increases in deaths, emergency admissions, A&E attendances, GP referral and NHS staff sickness absence appear to have occurred in 2014. These increases endure for around 12 months before abating. This is a repeat of the situation documented in 2008, 2010 and 2012; although the 2010 event was more sporadic. Unprecedented A&E pressures experienced during 2014 and into 2015 appear to have been exacerbated by the 2014 event. The usual factors which have been offered as 'explanations' for the increase in NHS demand may be merely contributory, but not causative of, the large surges in demand which occur during these events. Spatial spread of both deaths and sickness absence can be demonstrated. The ratio of follow-up to first attendances following GP referral for an outpatient attendance, show marked step-like changes during these events apparently due to the subtle changes in the case-mix and severity of the referred patients.

Key Terms

- Spatial spread is movement between locations
- Spatiotemporal spread is the spread of an infection between locations over time
- Spatial granularity implies that some areas are affected worse than others due to uneven spread of the infection due to factors such as population density.
- Social networks are comprised of family, friends, work colleagues, schoolmates or any other person to whom the infection can be spread by proximity or physical contact
- A running 12 month total or average is a tool used to detect sudden step-like changes in the rate of events such as emergency admissions or deaths.
- A step-like change implies that rate of events jumps suddenly, and then stays high for an extended period of time
- Time lags are observed between locations depending on the initiation of infection, or occur if different types of condition require an incubation period or rely on a series of

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biological processes before the symptoms are observed, or are serious enough to trigger medical intervention

- Apparent initiation date is the calculated initiation time observed in different geographical areas of markedly different size where the 'average' behavior for larger geographies is composed of spatiotemporal spread across all the small areas or social networks in the larger area.
- Modifiable Areal Unit Problem (MAUP), is a term used to describe why different geographic boundaries can create different apparent averages or initiation dates – an outcome of granular spatiotemporal spread.
- Synchrony or time clustering occurs when different events are linked to the same causative agent, however, a set of consistent time lags may also occur.

Introduction

The discovery that the sun, rather than the earth, was the center of our solar system was pivotal in understanding the correct movement of the planets in relation to each other. To some this new concept was considered heretical since it questioned a set of firmly held assumptions. The aim of this opinion piece is to facilitate a process whereby some of the key assumptions around emergency admissions can be questioned, and new approaches explored to deal with the seemingly inexorable rise in these admissions.

A current assumption regarding admissions, in general, is that they rise according to changes in the number of persons in certain age bands – population demographic change. Hence if 75-79 year olds have X admissions per thousand persons today, then if we double the number of 75-79 year olds we will double the number of admissions for those ages, but the rate of X per thousand will stay constant. The observed total change is the weighted sum of rates across all age bands. This assumption is subject to a flaw called the constant risk fallacy, i.e. that the rate of admissions per thousand head does not stay constant over time (Nicholl 2007). Recently observed escalating rates of adult appendicitis, which increase with age, are a good example of this effect (Jones 2015c)

While the rate of many surgical emergency admissions stays roughly constant over time, it has been observed over many years that the rate of medical admissions, especially in the older age bands, is constantly increasing (reviewed Jones 2009a). Up to the present this disparity has been largely attributed to a range of social and organizational factors (reviewed Jones 2015e). It has been recently argued that these factors alone cannot explain the fact that medical admissions tend to increase in surges, and that these surges have many of the characteristics of an infectious outbreak. (see reviews Jones 2013a,b,2015b). The multiple effect of these events can be traced back to the 1950's in the UK (Jones 2015a,f). There is evidence in the USA for similar surges in total health care costs, although data is only available since the 1960's (Jones 2013a-b, 2015a). Similar events have been documented in Australia (submitted) and New Zealand (in preparation) via the associated increase in deaths (Jones 2013e, 2014a), and simultaneous spatial spread of deaths and medical admissions can be demonstrated in Northern Ireland (in preparation). Detailed analysis of small-area spatial spread of deaths and/or medical admissions, confirms that each event takes around two years to reach every part of the UK (Jones 2013e-g, 2014b,e, Jones & Beauchant 2015), which implies a relatively difficult to transmit agent.

Each apparent outbreak leads to synchronous increases in emergency department attendances, medical admissions, and GP referrals; and shows age, condition and gender-specificity (Jones 2013a,b,d-f, 2014a-

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f, 2015a-h, Jones & Goldeck 2014). These outbreaks usually occur twice every decade, however, in the 1990's there was a four in a row series in 1993, 1995/96, 1999, and 2002 at intervals of around three years (Jones 2015a,e). This series led to such dramatic increases in medical emergency admissions that numerous studies were initiated (Jones 2015a,e). Unfortunately at that time, no one thought to look for evidence of spatial spread as would characterize a genuine infectious event, and hence these older studies reached a de facto conclusion that social, and structural factors in the health services were to blame (Jones 2013a, 2015e). Such factors, while undoubtedly important in their own right, are probably merely contributory (to a more general increase over time) rather than causative *per se* (of the specific, and much larger surge increases).

Possibly due to different strains of the same agent, each event has a variable effect upon different aspects of care. For example, the 2008 outbreak had a very large impact on GP referral for an outpatient appointment which was far greater than observed in other outbreaks (Jones 2012b). A persistent infection is implied due to the observation that deaths, admissions, and GP referral tend to endure for 12 or more months (reviewed in Jones 2013a, 2015e). In a persistent infection (e.g. HIV/AIDS, hepatitis, Lyme disease, herpes viruses, etc), once infected the person is usually infected for life, although the infection may be eventually bought under immune control. All infectious agents provoking an immune response show periodic outbreaks (Anderson et al 1984). Given the range of conditions specific to admissions, and deaths which increase during these events, a particular type of herpes virus (known to cause considerable immune manipulation) has been identified as a potential candidate (see reviews Jones 2013a,b, 2015b).

The latest three of these events occurred around 2008, 2010 and 2012, however, a survey of recent NHS data reveals that there may have been a fourth event commencing in early 2014 indicating an unprecedented four-in-a-row series at two year intervals.

If these events are genuinely infectious, then a whole cluster of health related issues such as A&E attendances, admissions, deaths, sickness absence, and outpatient attendance should show a degree of synchrony which is independent of health and social care, acute or primary care, or policy, but is dependent on changes in the health of individuals.

It must be emphasized that due to the specific type of analysis applied in this study, we are ***not*** looking for *temporary* events such as extremes of temperature, influenza epidemics, periods of poor air quality, etc.

This paper will review the evidence for a fourth event in the context of the earlier events, and will include spatial analysis of NHS staff sickness absence rates and deaths during these events – both highly indicative of a genuine infectious source.

Methods

Data Sources

NHS data is from three sources, namely, the Health & Social Care information Centre (HSCIC) website (http://www.hscic.gov.uk/searchcatalogue?productid=16774&returnid=1684), and the NHS England SITREPS website (http://www.england.nhs.uk/statistics/statistical-work-areas/ae-waiting-times-and-activity/weekly-ae-sitreps-2013-14/). Monthly data for deaths is from the Office for National Statistics (ONS) website. Time series data have been analysed using running 12 month or running 52 week totals. Additional detail is given in the footer to each chart.

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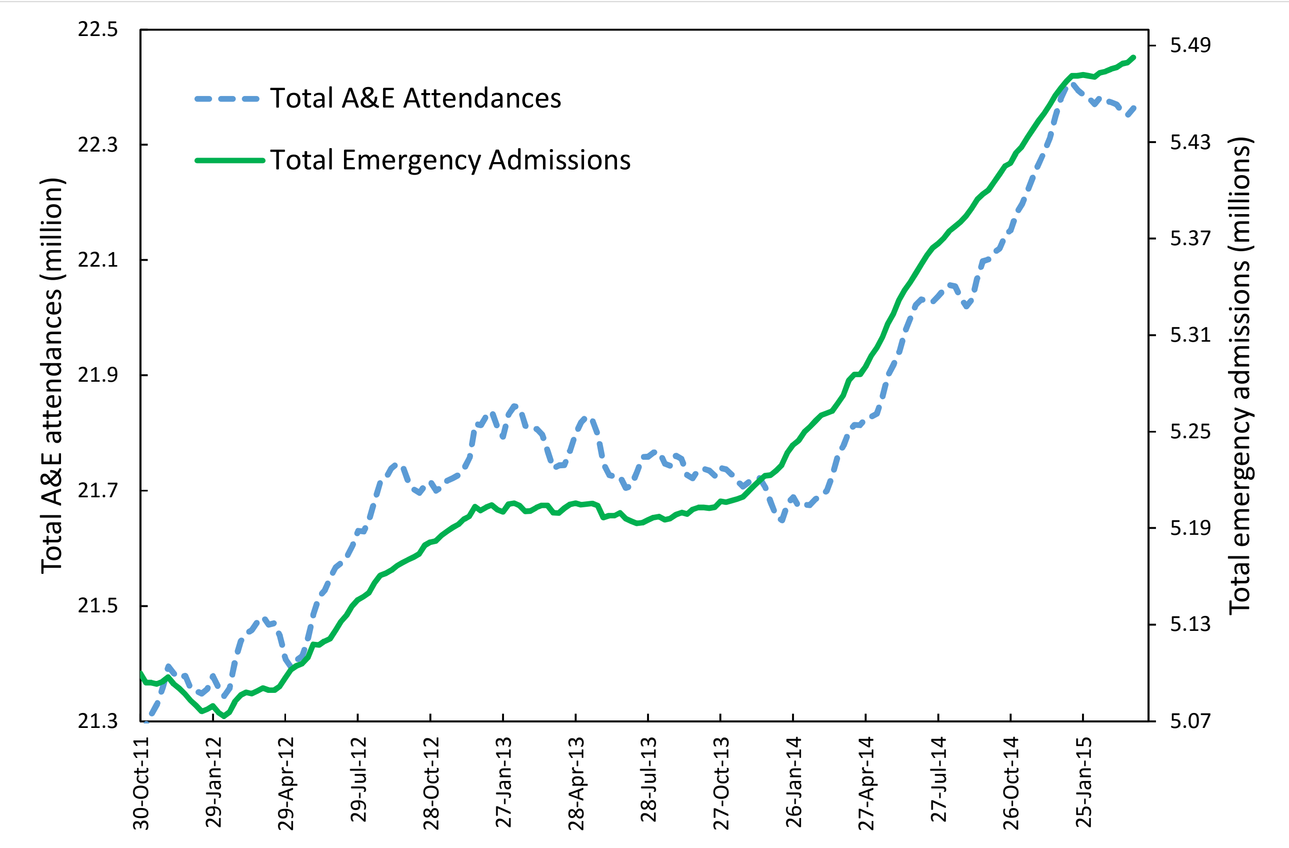
Statistical Significance

The changes observed in all of the England-level charts are so large that they exceed the 99.99% confidence interval (CI) for statistical variation (Poisson). While some of the percentage changes in staff sickness absence do not exceed the 95% CI (especially for the smaller organisations), the high degree of national synchrony precludes chance-based explanations. The differences in percentage change are therefore more a reflection of infectious granularity (Jones & Beauchant 2015).

Emergency Admissions

Figure 1 shows a running 52 week total for emergency admissions (all specialties) and A&E attendances (all types of A&E department) in England. Where the activity data shows seasonal variation (as for most aspects of health care), a running 52 week (or 12 month) total is an excellent way to show historical trends in a way which minimizes the seasonal behavior and dampens statistical variation (Foukal & Lean 1990).

Figure 1: Running 52 week total of A&E attendances and emergency admissions, England



Footnote: The data in Fig. 1 is from NHS weekly SITREP reporting

Using monthly/weekly data construct a 12 month/52 week total, move forward one week/month and recalculate the total, etc. Such a running total also has the advantage that it detects step-like changes in activity, i.e. when the activity suddenly experiences say a 10% increase. Hence the first month after a step change there will be 11 months at the (lower) previous activity and 1 month at the higher level. In the second month of the running total there will be only 10 months of the former lower activity and 2 months of the higher activity. The cumulative sum therefore turns the step change into a ramp, where the start of the ramp marks the initiation of the step change. This is an important concept and this thinking needs to be applied to all the charts.

At small area level this new type of apparent epidemic leads to step-increases in activity which endure for 12 to 18 months before abating (Jones 2009a,b, 2013a,d-e, 2014b,e, 2015a-d, Jones & Beauchant 2015). However small-area spatial spread across the entire UK and Europe is relatively slow and can take up to two years. Hence national-level data can show curious trends which can be misinterpreted in the absence of the knowledge of infectious spatiotemporal spread. As mentioned, in a running 12 month total chart the start of the step-like event is at the foot of a ramp upward. The slope of the ramp indicates the severity of the event, and the event must have permanent effects which endure for a minimum of 12 months for the ramp to continue without truncation. If the effects of the event endure for longer than 12 months, then the running total generates a plateau. Hence in Fig. 1 the 2012 and 2014 events can be clearly discerned (Commencing at the start of the two ramps), although the short duration between each means that the trends can tend to merge, and the decline in activity usually observed following each event is truncated (Jones 2010), hence the very large cumulative increase in Fig. 1 between 2011 and 2015.

However, as can be seen, the slope of the line following the 2014 outbreak is high, indicating that a sudden, large step-like increase in admission and A&E attendance rate occurred around January of 2014 and that the effect was greater than that experienced following the 2012 event.

Accident and Emergency (A&E) attendances

The A&E department can be disproportionately affected by these events due to vague symptoms of ill-health which accompany the seeming infectious outbreaks in younger persons and the increase in admission in older persons (Jones 2013a-c, 2014f, 2015c-f). Fig. 1 also gives a time series using a running 52 week total using weekly SITREPS data for attendance at all types of A&E department. Similar comments to emergency admissions apply however, note that the effect upon emergency admissions can lead or lag behind A&E attendances, and both age and presumably case-mix interact to determine the apparent point of onset for each event – a theme which will be repeated in later sections.

The ageing population is often blamed for the pressures on the NHS. The issue regarding age is explored in Fig. 2 which uses a running difference relative to the previous 12 months, i.e. running sum ending April 2012 versus running sum ending April 2011, etc. This method allows differences in timing and extent of the effect against different age groups to be revealed. Data in this figure is for attendances at all types of A&E (including minor injury units). Underlying growth in A&E attendances makes interpretation slightly more difficult, however the key points to note are as follows. A negative value means that activity has actually reduced relative to the previous 12 months. As before, the start of a ramp or inflection upward marks the onset of a step-like increase in activity, while the slope of the ramp indicates the size of the step-like increase, as does the value at the top of the ramp some 12 months later. The relatively slow spatial spread across England of the agent causing the step-like increases in attendance means that the ramps are non-linear. A ramp down marks the end of an event along with a step-like *reduction* in the rate of increase in attendances.

As can be seen in Fig. 2 the younger age groups appear to be affected first. However, due to the fact that the conversion rate from A&E to inpatient rises steadily with age, it is the older age groups which have the highest effect on inpatient admissions as per Fig. 1, and the difference in apparent start date implies that the elderly drive the large change in admissions rather than attendances. These subtle changes in age mix are also interwoven with changes in the case-mix arriving at A&E (Jones 2014f).

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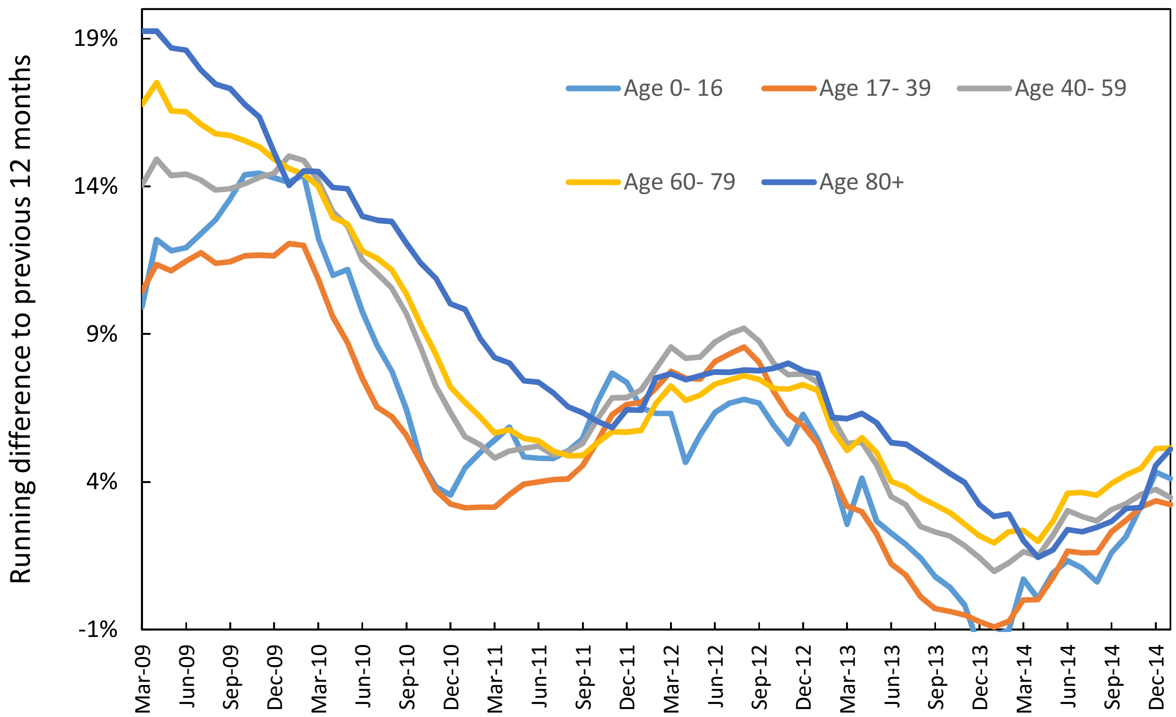
Figure 2: Running difference between successive 12 month totals for A&E attendances, by age group, England



Footnote: Monthly data is from the HSCIC website

These age-specific effects appear to account for the seeming differences in the apparent start date seen between the different charts, i.e. the start date is influenced by the age group having the largest number of admissions/attendances. This effect upon persons of working age will be explored in greater detail in the section which looks at the effect on NHS staff sickness absence rates.

In summary, a cumulative series of infectious-like events have increased A&E activity to such an extent that A&E departments began to be overwhelmed in 2012 (an effect which is exacerbated by a national shortage of A&E staff relative to this unexpected increase and by a shortage of medical beds), and the escalating activity since then has led to the current crisis.

GP referral and outpatient first attendance

These epidemic-like events have far wider effects than just A&E attendance, and acute inpatient care and GP referral for a Consultant first outpatient attendance also increases presumably due to fundamental shifts in population health (Jones 2012b). The effect on GP referral appears to be independent of the effects on emergency admissions, however, each outbreak appears to affect the case-mix of GP referrals (Jones 2014d) which is likely to reflect in changes in the ratio of follow-up to first appointments (Jones 2012c). Figure 3 shows the corresponding effect on GP referral for a first outpatient attendance (all specialties) and the ratio of follow-up to first attendances. The possibility of lags between GP referral and first attendance make the analysis more difficult and the unprecedented four-in-a-row series of outbreaks at roughly two year intervals seems to preclude the possibility of a

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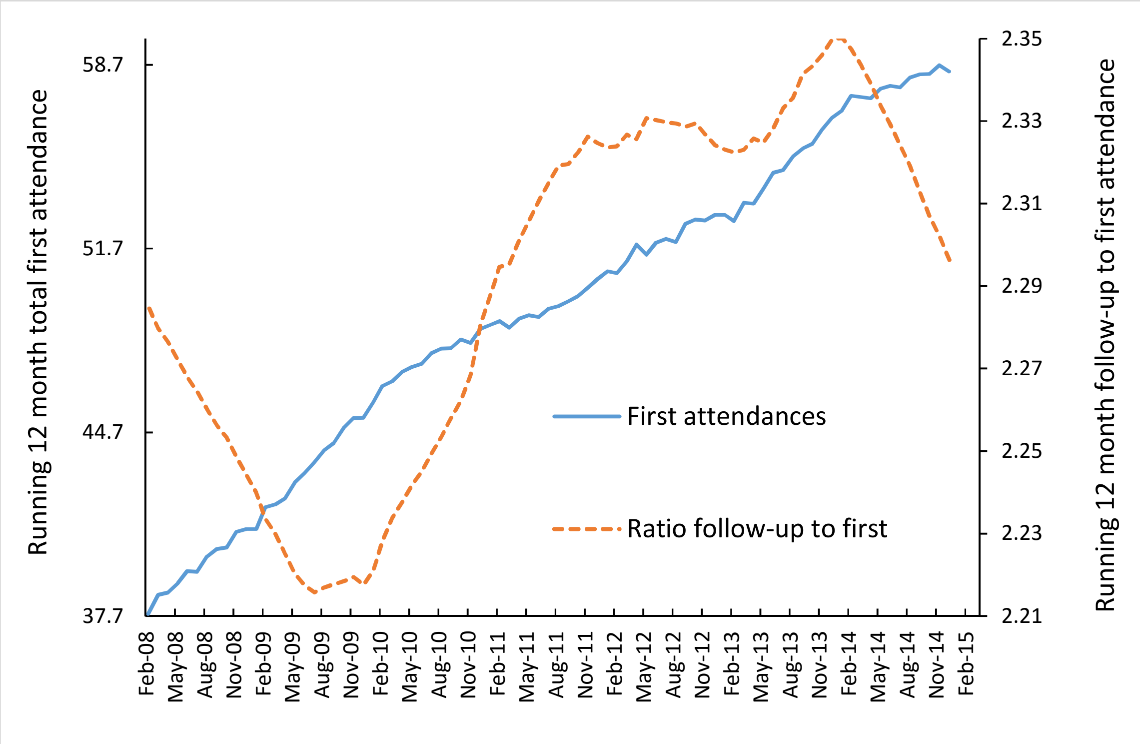
reduction in referral, i.e. the events have occurred so rapidly that there is little opportunity for the population to recover before the next event has arrived.

Figure 3: Running 12 month total outpatient first attendance and the ratio of follow-up to first attendances, England



Footnote: Data in Fig. 3 is from the HSCIC

However whatever the explanation, a number of ramps both up and down are evident. As has already been documented, the 2008 event/outbreak had a very strong effect upon GP referral (Jones 2012b). Due to subtle changes in the complexity and nature of the case-mix being referred by GP's during each event, it is also apparent that the initiation point of a new ramp marks the onset of profound changes in the ratio of follow-up to first attendances. Both the 2008 and 2014 outbreaks lead to net reductions in the follow-up to first ratio. The 2010 outbreak led to a large net increase, while the 2012 event appeared to have a minimal net effect, although the 12 months just before the 2014 outbreak saw a net rise. It is clear that the NHS is at the mercy of an agent of considerable influence, and any 'failure' on behalf of the NHS may have little to do with controllable or structural/efficiency issues.

Sickness Absence Rates

A genuine infectious agent will affect the general population across all age groups, although in the younger age groups the infection is likely to lead to a vague/syndromic illness rather than a need for acute care (Jones 2013a-c, 2015b). An effect on NHS staff sickness absence rates would therefore be expected to occur, and Fig. 4 confirms that this has indeed happened using a running 12 month average rather than a 12 month total. Note that Fig. 4 commences with both the final spatial spread of the 2010 outbreak and the 2009/10 swine flu epidemic. In a running 12 month average chart the combined effect of these two events dilutes out of the chart and is no longer present by March 2011. In Fig. 4 all regions

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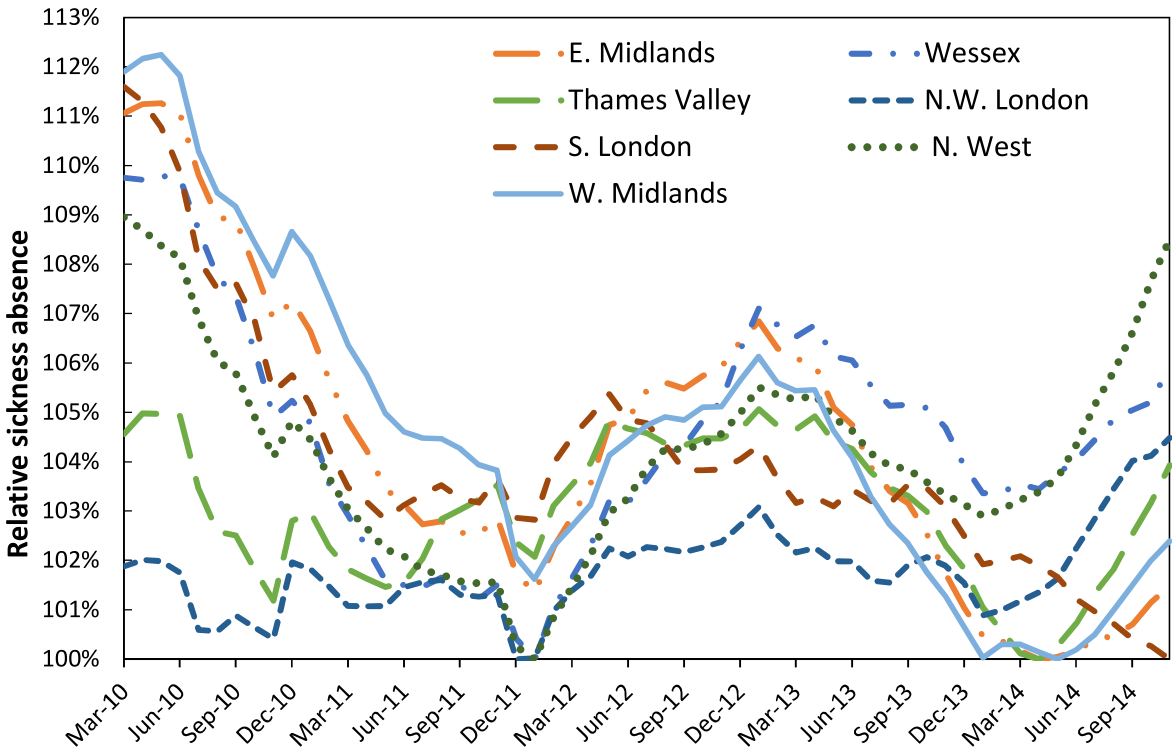
have been adjusted relative to the point of minimum average sickness absence in the running 12 month total.

As can be appreciated, NHS staff are adults below retirement age (the average age of NHS staff is 43), and this demonstrates the far wider effects of these epidemics against general sickness, which will not usually result in hospital admission, but will almost certainly lead to increasing demand for GP appointments. Multiply this many fold across the entire population, and the pressure on GP appointments can now be fully appreciated in its correct context.

Figure 4: Running 12 month average sickness absence rates for NHS staff, by region



Footnote: Data in Fig. 4 is from the HSCIC. All sickness absence relative to the minimum 12 month average.

Regional variation

All infectious outbreaks show spatial granularity with a mix of chance exposure, transmission along different social networks and local socio- and geo-demographic factors contributing to this uneven exposure. To investigate this hallmark feature of an infectious outbreak Fig. 5 explores regional variation in staff absence rate. All regions have been adjusted relative to their own minimum for the running 12 month average of sickness absence which occurs either around Dec-11 or Mar-14.

Firstly, note the wide variation in the effect of the combined 2010 outbreak and the swine flu epidemic with maximum effect in West Midlands through to little effect in NW London. Spatial spread is confirmed by the slight differences in the timing of the peak in absence rates between Mar-10 to May-10. This confirms wide variation in deaths observed due to the 2010 outbreak using monthly data at Local Authority level (Jones 2015a,d). Maximum 12 month change following the 2012 outbreak ranges from +7.1% increase in Wessex down to +2.5% in South London. Then note the difference in response to

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the 2014 outbreak, with the North West showing the strongest response through to a negligible response in South London as at October 2014 (latest data available).

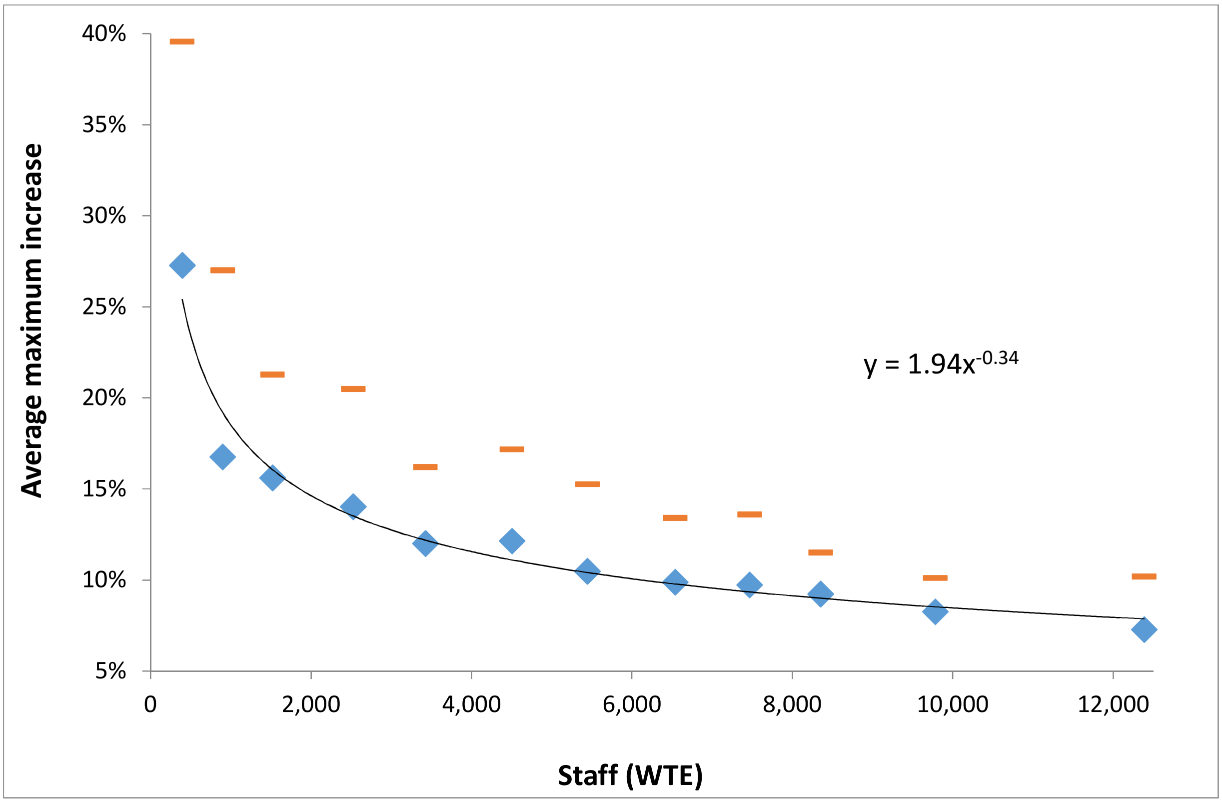
Table 1: Initiation date for increased sickness absence at particular organisations in the East Midlands region

Organisation	Initiation
East Midlands Ambulance Service	Apr-14
Northampton General Hospital	Apr-14
Nottingham University Hospitals	Apr-14
Leicester University Hospitals	Apr-14
Leicester City CCG	May-14
Derbyshire Healthcare, Derby	May-14
Kettering General Hospital	May-14
Nottingham Citycare Partnership	May-14
East Midlands	**Jun-14**
Northamptonshire Healthcare	Jun-14
Derby Hospitals	Sep-14
Leicestershire Partnership	Oct-14
United Lincolnshire Hospitals	Oct-14
Rushcliffe CCG, Nottingham	Nov-14
Derbyshire Community	>Nov-14
North Derbyshire CCG	>Nov-14
Lincolnshire Community	>Nov-14
Lincolnshire Partnership	>Nov-14
Lincolnshire West CCG	>Nov-14
Nottinghamshire Healthcare, Nottingham	>Nov-14
Sherwood Forest Hospitals, Nottinghamshire	>Nov-14

The issue of spatial spread is investigated further in Table 1 for organisations in the East Midlands region, which appears to represent generally later initiation of the 2014 event. As can be seen, the East Midlands ambulance service is the first to be affected around April 2014, probably due to wide exposure of ambulance crews to infected persons in the community. The apparent initiation date for the region is around June, however, regional data are a composite picture of more local spread. Tentative spatial clusters can be seen in Lincolnshire (all three organisations not effected before November 2014) and Nottingham (two organisations in April/May). The exact effect on each organization will however depend on the range in locations of staff working for each organization, and the degree of exposure to infected persons.

Lastly, the effect of organization size (more correctly range of locations where staff are located and/or live, and opportunity to interact with infected persons) on the apparent increase in sickness absence during the 2012 and 2014 events is illustrated in Fig. 5, where the observed increase increases with smaller size. While this is partly due to the effect of size on statistical variation, it also represents a dampening effect due to staff living in disparate locations which experience the outbreak at different times, i.e. early and late initiation tends to cancel out the observed effect on the percentage increase (Jones & Beauchant 2015). The size of the + 1 standard deviation bar in Fig. 5 partly reflects the effect of size on Poisson-based variation, and of the contribution of infectious granularity, such that organisations in different locations can experience disproportionate financial pressures.

Figure 5: Effect of size on apparent increase in sickness absence



Footnote: Data for 250 NHS organisations has been allocated to equally spaced bins at increments of 1,000 WTE and averaged, except for first bin which has been split into two and last two bins which have been combined. Bars represent + 1 standard deviation for the range in percentage increase experienced by organisations in each bin.

Having considered the effect of these outbreaks on a range of measures, the effect upon deaths will now be considered as the ultimate expression of a genuinely infectious outbreak.

Deaths (all-cause mortality)

Both increased deaths, and the spatial spread of deaths within the UK and across Europe have been documented for earlier outbreaks (Jones 2015a,e). Table 2 shows the apparent initiation dates for the 2014 outbreak for the 100 largest geographic areas in England and Wales. The apparent initiation date is influenced by the size of the geographic area since spread within each geographic area is a composite picture of very small area spread. Note the cluster of apparent initiation dates around May and June of 2014. Unpublished studies indicate that deaths are a lagging indicator of the outbreaks, such that deaths increase around 6 weeks after the increase in emergency medical admissions. Other time lags for different groups have been noted earlier in this study.

Table 2: Apparent initiation dates for increased deaths arising from the 2014 outbreak in regions, and 100 largest counties and towns in England and Wales

Initiation	Region	Counties, Cities and Towns
Jan-14	None	Kirklees
Feb-14	None	Newcastle-upon-Tyne
Mar-14	None	Bromley, Tyne & Wear (MC)
May-14	London, North West, Outer London	Birmingham, Bolton, Buckinghamshire, Cardiff, Carmarthenshire, Cheshire East, Croydon, Cumbria, Derbyshire **+ 19 others**
Jun-14	England, Wales, most other regions	Cheshire W & Chester, Cornwall, Dudley, E Devon, East Riding of Yorkshire, E Sussex, Essex, Greater Manchester **+ 24 others**
Jul-14	None	Bexley, County Durham, Herefordshire, Norfolk, Northumberland, Sefton
Aug-14	Inner London	Arun, Barnet, Barnsley, Bournemouth, Central Bedfordshire, Coventry, Swansea, Warwickshire, W. Sussex, Wolverhampton
Sep-14	None	Bradford, Brighton & Hove, Liverpool, Sandwell, Sheffield, South Gloucestershire, Surrey
Oct-14	None	Cambridgeshire, Gloucestershire, Hampshire, Tameside
Nov-14	None	Enfield, Rhondda, Leicestershire, Warrington
Dec-14	None	Calderdale
>Dec-14	None	Bristol, Derby, Leicester, N. Somerset, Salford, Stoke-on-Trent, Sunderland, Shropshire, Suffolk

As with all other measures affected by these outbreaks, there is ample evidence for fairly slow spatial spread (Table 2), and wide variation in the magnitude of the effect (data not shown but as illustrated in Fig. 5). The spread of apparent initiation dates is wider than that in Table 2 for smaller local authority areas (data not shown).

Effect on costs

The increased volume of GP visits, GP referrals, follow-up attendances, ambulance journeys, A&E attendances, emergency admissions, staff sickness absence, and end of life care during these outbreaks will have an unavoidable effect upon costs (Jones 2012a). Table 3 attempts to give a lower estimate for the impact upon costs of the 2014 outbreak (still ongoing in 2015). Given that the 2014 outbreak was the last of an unprecedented four-in-a-row series of outbreaks at just two year intervals, the NHS has therefore experienced somewhere in excess of £3,000 million of unanticipated costs since 2007, and it is disappointing in the extreme that the NHS has been largely blamed by the government for the ensuing cost pressures. Such a blame culture has deflected attention away for the desperately needed research into locating the real causative agent.

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Table 3: Extra deaths and a conservative estimate of costs

Area	Extra deaths	Step Increase (%)	Cost (Million's)
England	25,300	6%	£ 760
London	3,100	7%	£ 90
Inner London	900	6%	£ 30
Largest 82 LA	15,500	11%	£ 470
Wales	1,700	6%	£ 50

Operational Consequences

The health & social care system in the UK is highly vulnerable to such unexpected events and rapidly descends into capacity overload.

The high level of spatial granularity implies that different acute, social and primary care organisations will experience different operational, and financial pressures which are not anticipated in the current funding formula (Jones 2011, 2013c, 2015d), and imply levels of staff flexibility not present in current staffing arrangements (Jones 2013g).

Wider Relevance

In the field of actuarial science it has become increasingly apparent that current actuarial models are failing to capture the full complexity of the actual time trends for deaths - as illustrated in Table 2 (see Cairns et al 2014). It would seem that the age-dependent consequences of these infectious-like events regarding deaths (Jones 2013e, 2014a, 2015a,h) are being noted in other fields. These same factors lead to considerable volatility (financial risk) associated with end-of-life costs (Jones 2012d).

Recommendations

If we are to genuinely control rising emergency admissions, we must understand the root causes. Current strategies appear to be addressing the relatively minor background growth which occurs in the interval between these events, and may lead to disappointing results simply because they have not addressed the root issues behind the step-like events. Urgent research is required to verify if these events have a genuine infectious basis. Whatever their cause, it is obvious that funding needs to show greater flexibility to respond to the recurring consequences of these events, as does staffing flexibility in both health and social care which experience the peaks in demand and cost simultaneously.

Conclusion

The concepts illustrated here are not new, and a series of articles in BJHCM in early 2009 presented the evidence for these epidemic-like events, and their multiple effects on medical admissions, bed occupancy and costs (Jones 2009a-d). A 2010 study explored the effects on medical admissions in Northern Ireland (Jones 2010), i.e. the effect is felt in all parts of the UK. The novel findings presented here are the breadth of the effects against A&E attendance,

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medical admissions, GP referral, sickness absence and death, and that an unprecedented four-in-a-row series of these events may lie behind recently observed A&E pressures.

Indeed in their role as primary supporters and promoters of policy, government agencies may even be (inadvertently?) attempting to deflect attention away from the reality of these events (see analysis in Jones 2013f, 2015g,h). Instead, politically correct explanations based around the 'failure' of the NHS to control demand are deflecting attention away from the real root cause(s) for the very large step-like events.

As a point of interest, little can be observed in any of the data for a major effect of the winter 2014/15 influenza outbreak. Inappropriate antigen selection in the vaccine was forecast to lead to a surge in admissions, however, any such surge is not large enough to show up in the running 52 week and 12 month charts, i.e. the majority of the effect arose out of the earlier 2014 event/outbreak rather than influenza *per se*.

On this occasion the data speaks for itself, and from the above charts it looks like the UK has just experienced a four-in-a-row series of events in unusually rapid succession, which from a capacity and cost perspective is very grave news. However, regional variation is likely to be high as was observed following the 2008, 2010 and 2012 events, and some locations will experience greater activity and cost pressures than others.

It would seem we need a fundamental reevaluation of exactly how the NHS is supposed to cope with a seeming genuine epidemic over which it has no control, and is consequently powerless to halt the associated inexorable rise in activity and cost. Pretending that these events do not exist is somewhat less than helpful in attempting to address a potential public health issue of profound importance.

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