

What caused the spike in mortality in England and Wales in January 2015?

Lucinda Hiam¹, Danny Dorling², Dominic Harrison³ and Martin McKee¹

¹London School of Hygiene and Tropical Medicine, London WC1E 7HT, UK

²School of Geography and the Environment, University of Oxford, Oxford OX1 3QY, UK

³Blackburn with Darwen Borough Council, Blackburn BB2 1DH, UK

Corresponding author: Lucinda Hiam. Email: lucinda.hiam1@student.lshmt.ac.uk

Introduction

In the accompanying paper, we described the exceptionally large increase in mortality in England and Wales in 2015, showing how it was driven by deaths among older people, and pointed to a need to look at the functioning of the health and social care system. While that paper examined the overall increase in deaths in 2015, it also noted a very large spike in deaths in January. So far, consensus is lacking on its causes, with some suggesting influenza and cold weather, and others, the cuts to health and social care.^{1,2} In this essay, we examine the January spike in more detail.

Methods

There are four possible causes when mortality spikes in a population. First, is it real or is it data artefact? Second, has there been an environmental shock, such as a natural disaster or extreme weather event? Third, was there a major epidemic? Fourth, could it be a widespread failure of the health and social care system? We tested each in turn. Given constraints on space, a full list of data sources used is in the Web Appendix.

Results

Data artefact

Any analysis of changes in mortality must first consider data artefact. There have been many examples of changes in numerators or denominators giving rise to apparent anomalies. Problems with the denominator can arise where there is mass migration, changes in criteria for inclusion in the population or errors in the census or population register. For example, the first two were identified as problems in mortality data in countries involved in the wars in former

Yugoslavia.³ The apparent stagnation in life expectancy in Malta in the 1970s was due to a failure to update population estimates (J Mamo, personal communication). Problems with numerators most often affect cause specific death rates, due to changes in death registration or coding.

Several of these can easily be discounted. One is rapid mass inward migration of people with a higher risk of death. Most of the excess deaths were among the very elderly, who are least likely to be immigrants and, notably, most migrants arrive in the UK in good health, the 'healthy migrant effect'.⁴ Furthermore, in-migration of the elderly would be recorded by the Office for National Statistics, which uses registration with a NHS general practitioner to record migrants, and where there have been problems in the past, this has affected younger migrants who might not register and not the frail and old. It will, of course, be important to monitor this carefully in the future given the potential for large numbers of elderly British migrants who previously retired to Southern Europe to return if they lose their rights as EU citizens. There is, however, no evidence that this is yet happening on a significant scale.

Given that dates relate to time of registration rather than death, an increase in January may reflect delay in registration of deaths occurring at the end of the previous year but, had this happened, we would expect a decline in weekly deaths in the last few weeks of 2014, which did not occur.⁵ There was an increase in number of inquests opened in this period,⁶ but this would have delayed registration of deaths that did actually occur in early 2015. Thus, artefact does not seem a plausible explanation for the changes seen.

Environmental shock

One possible explanation for a sharp spike is an environmental shock, such as war or natural disaster.

While these particular explanations are easy to exclude, other large-scale causes are not always immediately clear. One example is the mortality seen from the London smog in 1952, where the increased mortality was also attributed initially to influenza but eventually, and somewhat reluctantly, accepted to be the result of air pollution.⁷ Cold weather is known to have an impact on mortality, particularly in older populations, and has been cited as a cause of the rise in 2015.⁸ However, the mean monthly temperature between September and January in 2014–2015 was above the average for the years 2009 to 2014 (Figure 1).

Epidemic disease

Public Health England (PHE) has suggested that the higher mortality in 2015 might, in part, be due to influenza.² Given, as noted above, how death rates were higher throughout almost all of the year, influenza, with its seasonal pattern, can, at most, only be a partial explanation. However, it is clearly one that requires exploration, and especially in relation to the January 2015 spike.

One argument that has been used to implicate influenza is that, in the 2014–2015 season, the predominant circulating virus was A(H3N2), thought to affect older people disproportionately. Yet this strain is not necessarily especially lethal – there was

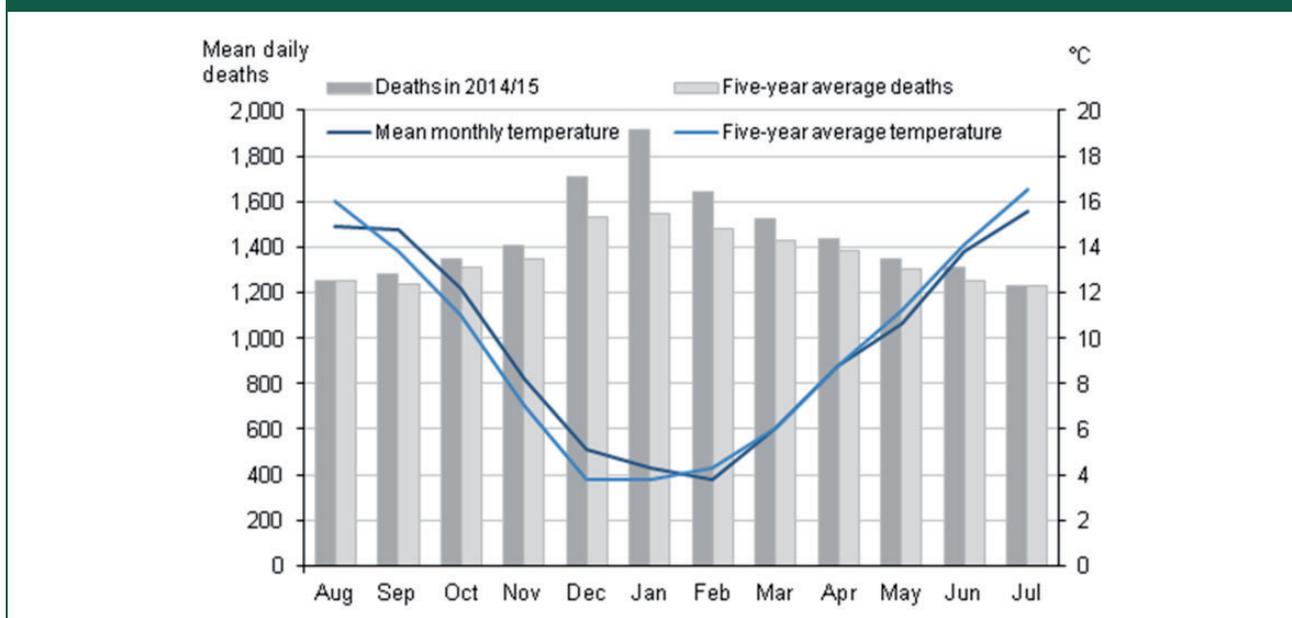
no marked excess mortality when it last circulated in 2008–2009. However, it has also been suggested that the vaccine in use in 2014–2015 was less effective than usual. Vaccination can be 70%–80% effective when there is a good match between the vaccine and strains in circulation, but in 2014–2015 antigenic drift resulted in 29% effectiveness against influenza A and 46% against influenza B. Vaccination is still recommended in these circumstances, and the uptake in England was 72.7% for those aged 65 years and over (five-year average uptake 73%). However, it is plausible that more older people were at risk because of lower protection than usual.

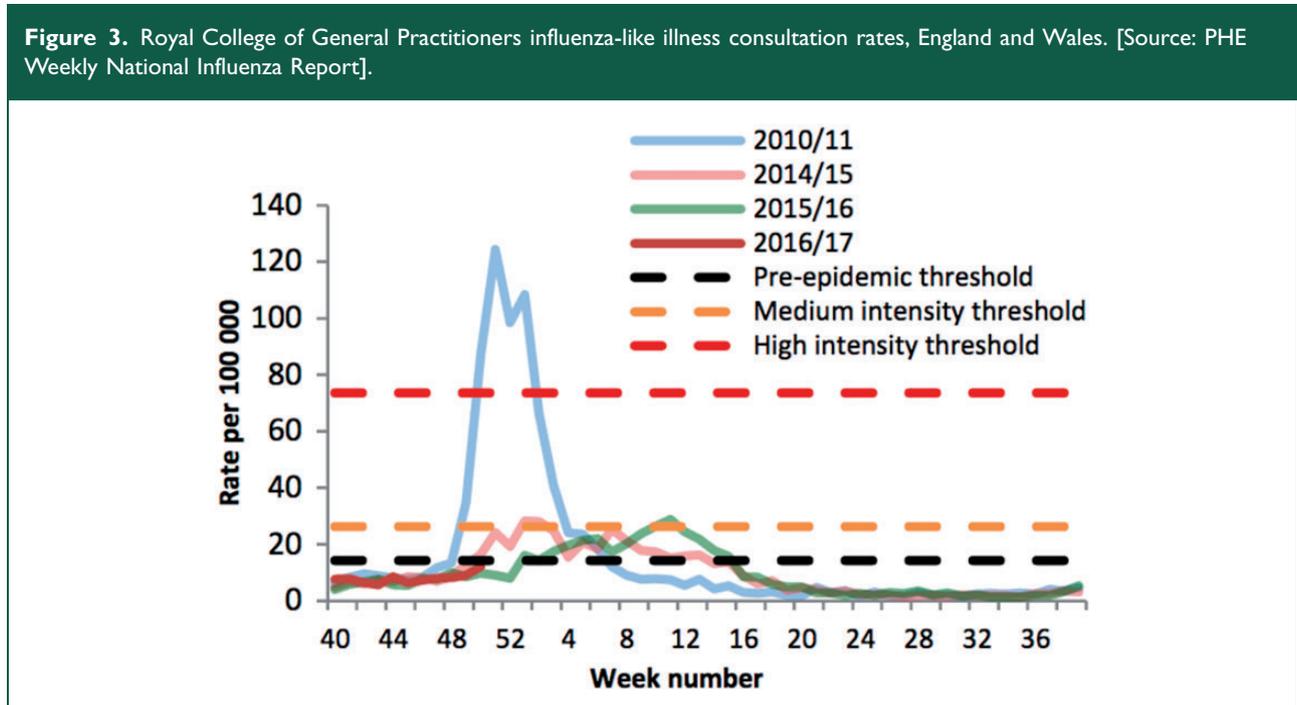
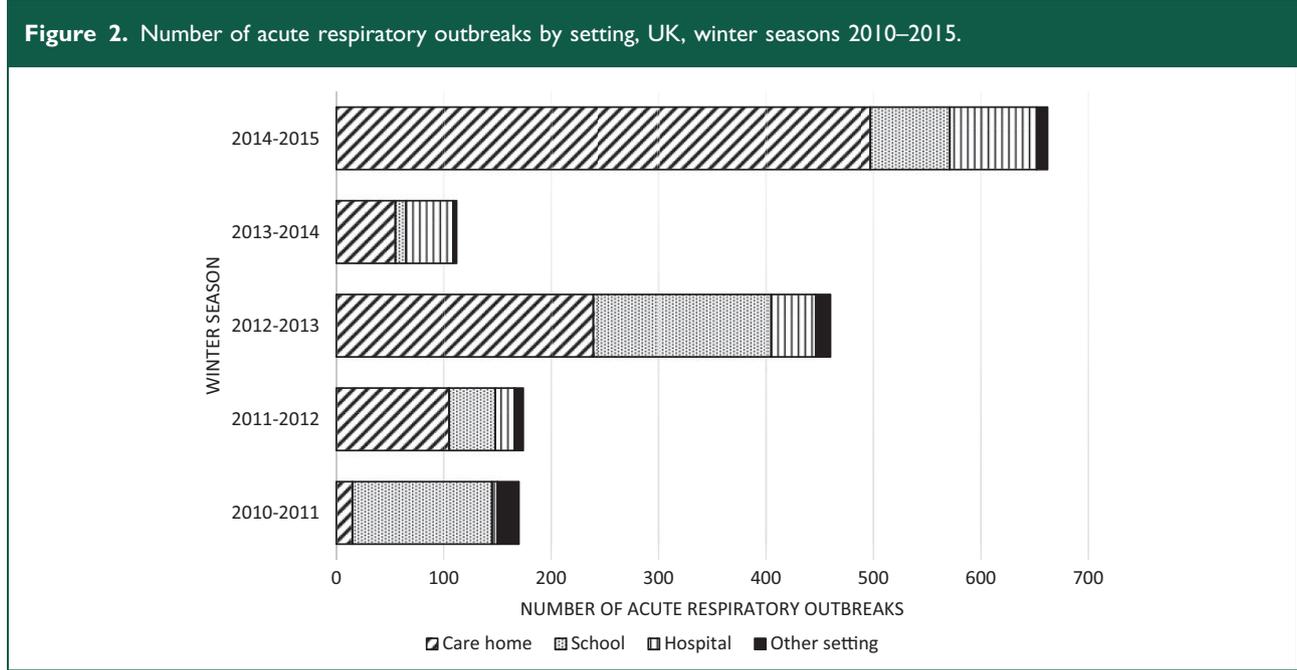
Public Health England has also suggested that the high number of deaths could be linked to outbreaks in care homes, and an especially high incidence among older people. This is borne out by data on the settings of outbreaks (defined as two or more cases within seven days of each other – not necessarily virologically confirmed – in an institution such as a school or care home) during the last five years between week 40 and week 20 shown in Figure 2 (except for 2014–2015 where data were for week 40 (2014) to 15 (2015) only).

In marked contrast, consultations in primary care for influenza-like illness in England in 2014–2015 were not exceptional (Figure 3).⁹

What is unusual, however, is that deaths attributed to influenza in 2015 rose, although not exceptionally

Figure 1. Mean number of daily deaths each month and mean monthly temperatures, England and Wales, August 2014 to July 2015. [Source: ONS].





so, and remained high for months, in contrast to almost all previous outbreaks which lasted only a few weeks, and were associated with dramatic rises and falls in mortality.^{10,11} Fleming et al.¹⁰ have presented patterns of weekly incidence of influenza-like illness by age for a selection of the more severe epidemics prior to 2007 and 2015 shows a quite different pattern. This suggests that what is being observed

cannot easily be attributed to influenza. Moreover, it certainly does not explain the January spike.

Influenza does, of course, cross borders with impunity so it may be instructive to look at what happened in the UK's European neighbours. EuroMOMO is a system that monitors winter mortality above that expected in the absence of seasonal variation.¹² It estimated that there were 217,000

premature deaths in the population over 65 years in the European Union-28 in 2014–2015,¹³ a higher number than usual. Excess mortality varied among countries, with the UK (excluding Northern Ireland) ranking fifth behind Portugal, Hungary, Spain and the Netherlands. Despite colder winters, Denmark, Norway and Sweden had lower excess winter mortality rates, and Estonia and Finland did not experience any excess. An initial analysis has linked this to increased detection of influenza by European surveillance schemes. Molbak et al.¹⁴ analysed the deviation from expected mortality (Z-score) for those aged 65 years and over, alongside influenza detection rates. Their findings suggest that influenza cannot be the sole, or even most important, explanation for the observed excess mortality, as influenza incidence remained high after week 3, when mortality began to return toward baseline. Moreover, even if it did contribute, there is a need to explain the marked inconsistencies among countries. To examine this more closely, we compared the levels of transmission intensity of influenza-like illness in successive weeks in Sweden, Finland, England and Wales, with reference to when the z-score for excess mortality among those aged 65 and over equalled or exceeded two.¹⁴ Excess mortality occurred in only two weeks in Sweden, both of which saw high intensity of transmission, and none in Finland, even when transmission was high. However, this excess occurred in 11

weeks in England, even though the intensity of transmission never rose above medium, and in three weeks in Wales, with transmission low in two of them and unknown in the third.¹⁴

While there is the problem of a relatively ineffective influenza vaccine, and outbreaks in care homes accommodating especially vulnerable people, the pattern of mortality over time is quite different to that seen in previous outbreaks, and excess mortality occurred at levels of transmission intensity that, in other countries, were not associated with a large mortality excess.

Failure of the health and social care system

January 2015 saw markers of NHS performance deviate substantially from earlier patterns. All the standard measures, except cancer care, worsened markedly. Calls to NHS 111 rose dramatically, with a greater proportion than usual resulting in an ambulance being dispatched or attendance at primary or secondary care advised. All ambulance call-out times fell below target, including those for immediately life-threatening responses. Even though A&E attendances did not increase, and a closer examination shows that they were lower than in the same month in previous years (Web Appendix), both waiting times in A&E and for admissions increased (Figures 4 and 5). Waiting times for diagnostic tests

Figure 4. Total attendances including specialty, A&E, minor injuries and total attendances waiting over 4 hours, 2010–2015, NHS England.

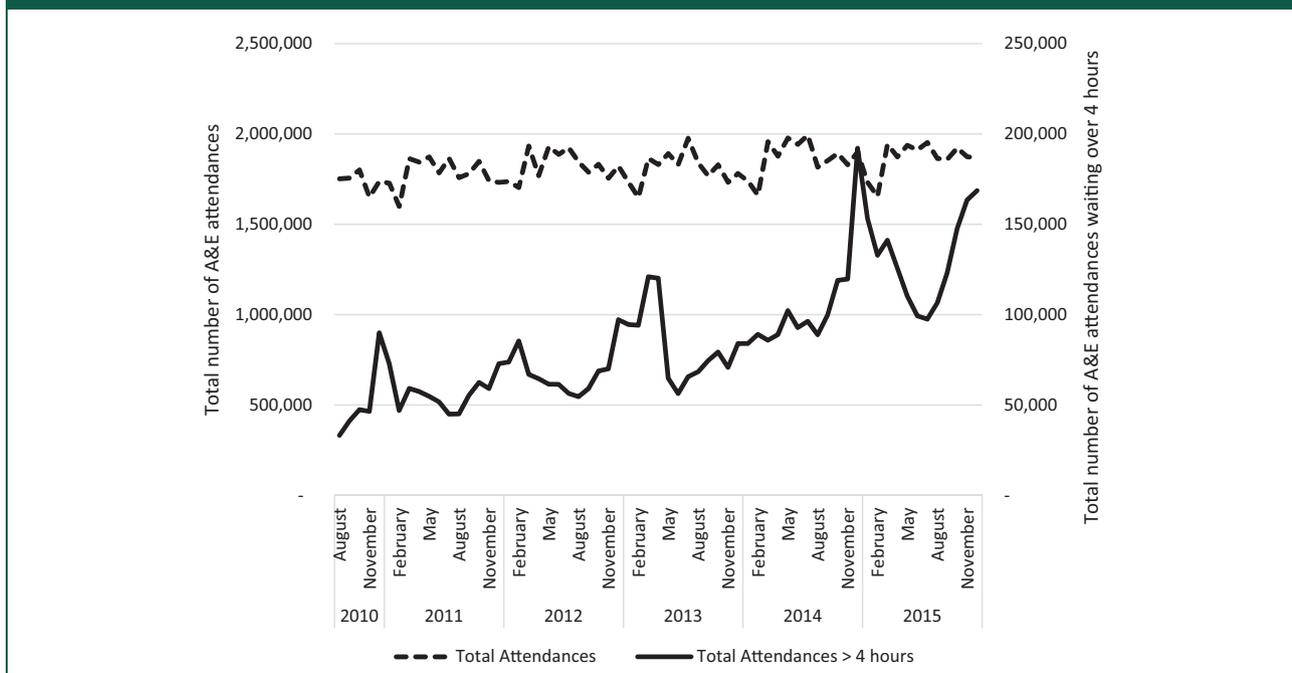
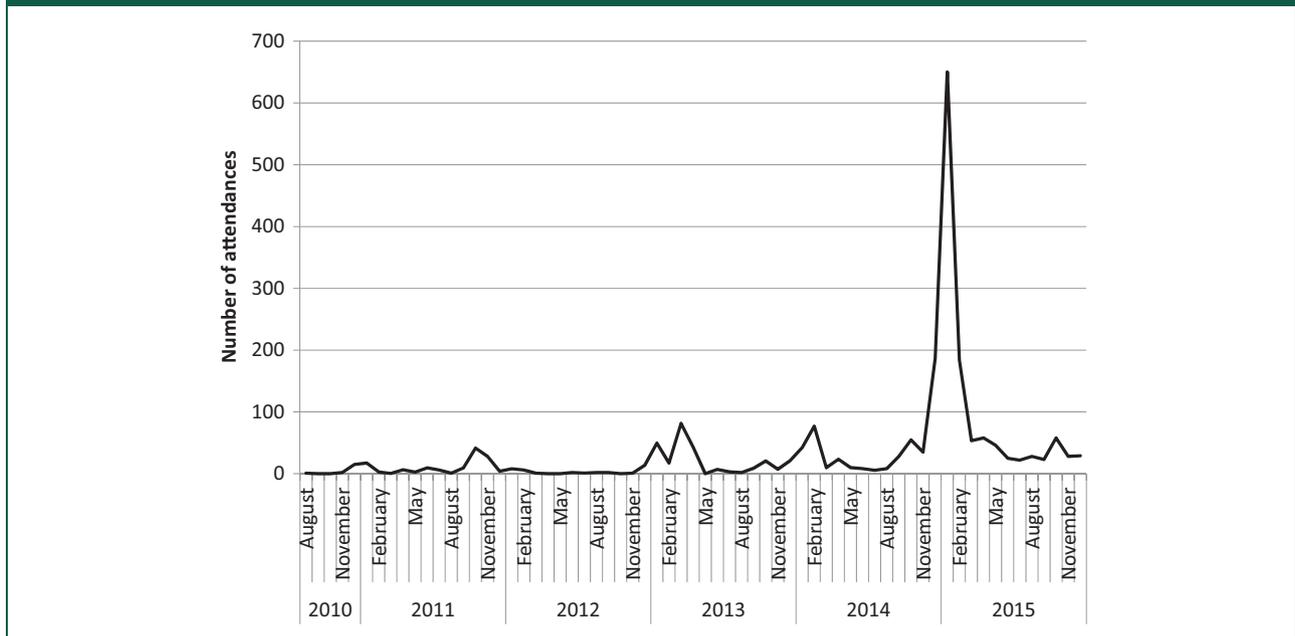


Figure 5. Number of patients spending over 12 hours from decision to admit, to admission, 2010–2014, NHS England.

and consultant-led care increased, and operations cancelled for non-clinical reasons rose markedly. Delayed transfers for care peaked, leading to a shortage of beds, perpetuating the wait in A&E. Staff absence rates rose and more posts remained empty as staff had not been appointed.

Discussion

This study has many limitations. It is an exploratory analysis, attempting to address a complex phenomenon, and as such the evidence presented should be viewed as preliminary, with the hope of generating debate and further in-depth scrutiny of what caused this marked increase in mortality.

Given these constraints, we cannot reach a firm conclusion about what has happened, but we can at least point to fruitful lines of further inquiry, as well as discounting some possible explanations. Specifically, while the reduced efficacy of the influenza vaccine being used may have played some role in the January 2015 mortality spike, this is likely to have been limited. We can also exclude common sources of data artefact. Instead, the evidence points to a major failure of the health system, possibly exacerbated by failings in social care.

Our findings should be seen in the context of the worsening financial situation of the NHS. Since the 2010 election, the impact of cuts resulting from

the imposition of austerity on the NHS has been profound. Expenditure has failed to keep pace with demand, and the situation has been exacerbated by dramatic reductions in the welfare budget of £16.7 billion and further reductions in social care spending.¹⁵ Although recent changes to accounting practice have increased the reported share of gross domestic product spent on health in the UK by including money previously recorded under social care, it still lags well behind neighbouring countries such as France, Germany, and the Netherlands.¹⁶ NHS Foundation Trusts reported that 2014/15 was an ‘exceptionally challenging year’, culminating for the first time in a net deficit of £349 m,¹⁷ and in May 2016 the NHS reported its largest ever deficit at £2.45 billion.¹⁸

With an ageing population, the NHS is ever more dependent on a well-functioning social care system. Yet, social care has also faced severe cuts,¹⁹ with a 17% decrease in spending for older people since 2009, whilst the number of people aged 85 years and over has increased by almost 9%.^{20,21} The Association of Directors of Adult Social Services reported a 3% increase in the older population between 2014–2015 and 2015–2016, without an increase in numbers receiving services.²² To maintain current levels of care would require an extra £1.1 billion, which the government has refused. This will become much worse given the higher prices of imported drugs and equipment following the EU referendum, while the potential loss of

health and social care workers from other EU countries will exacerbate staffing problems.

The Care Quality Commission has raised alarm about the impact of social care cuts,²³ noting how A&E departments are struggling, leaving elderly people at risk, increasing admissions and delaying discharges, with a 70% increase in those unable to be discharged for this reason from April 2012 to July 2016.²⁴ The Nuffield Trust attributes this to issues with ‘patient flow’ within hospitals,²⁵ but does not link increased vulnerability in the community to increased mortality, despite the many failings that might, in combination, play a role.

The total number of beds in care homes has fallen between 2010 and 2016 from 255,289 to 235,799 – a drop of 19,490 in almost six years²⁶ and there are concerns for the viability of many operators. Summer is traditionally a quieter period for the NHS, yet 1 in 10 patients waited over 4 hours in A&E in June, July and August 2016.²⁷ It is now clear that this was a warning of a looming crisis in winter 2016–2017,²⁸ with mounting evidence that the health and social care system is not coping.²⁹ What some portrayed as ‘unexceptional’ in 2015 or due to influenza now appears to be an established pattern. Provisional weekly death data from the Office for National Statistics show from week 40, deaths have increased by 7% when compared to the five-year average, including the exceptional year 2015. Between week 40 and week 49, there were 102,083 deaths. Influenza can once again be excluded as the main cause, with the Royal College of General Practitioners influenza-like illness rate (see Figure 3) showing levels below pre-epidemic level, as they were for 2015. Additionally, until late December, it had been a very warm winter, with a mean temperature of almost 8°C in the UK in December, one of the highest on record.

Conclusion

The year 2015 saw an unprecedented rise in mortality in England and Wales – the greatest rise for almost 50 years – with a particularly large spike seen in January. Explanations presented up until now do not conclusively explain that rise, but do provide serious cause for concern, with the deaths occurring in the context of massive disinvestment in both health and social care, and almost all NHS performance markers falling below their targets. The possibility that the cuts to health and social care are implicated in almost 30,000 excess deaths is one that needs further exploration. Given the relentless nature of the cuts, and potential link to rising mortality, we ask why is the search for a cause not being pursued

with more urgency? Rising mortality is concentrated amongst those groups most reliant on such spending.

The report of the Care Quality Commission on the situation in summer 2016 should act as a powerful warning. Taken with the evidence reviewed here, there is a strong case for arguing that more staff and funding for both health and social care are required urgently to prevent further avoidable mortality. Yet, despite claims by some current cabinet ministers that leaving the EU would generate an extra £350 million per week for the NHS, the government reportedly has no plans to increase funding.³⁰ Simply reorganising and consolidating existing urgent care systems or raising the ‘agility’ of the current A&E workforce capacity is unlikely to be sufficient to meet the challenges that high levels of admissions of frail elderly people and others who are vulnerable are likely to present this winter and in future winters. Unfortunately, it seems the increase in mortality seen in 2015 is already repeating itself in 2016. Without urgent intervention, it is likely that this trend will continue.

Declarations

Competing interests: MM, DD and DH are unpaid members of Public Health England’s Mortality Surveillance Advisory Group.

Funding: None declared.

Guarantor: LH.

Ethics approval: Not applicable.

Contributorship: LH is a post-graduate student at LSHTM, under the supervision of MM. Having noted the increase in mortality, and suggested explanation of ‘flu’, they decided to explore this possibility with help of DH and DD. Using publicly available data from the Office for National Statistics, NHS England and Public Health England, the analyses and hypotheses were developed and explored. LH wrote the paper initially as her dissertation under Prof McKee’s supervision. LH then converted this into the two present papers with substantial input from MM and ongoing advice from DD and DH, each of whom have extensive experience in research on mortality patterns and trends.

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Provenance: Not commissioned; peer-reviewed by Julie Morris and peer reviewers’ comments from a previous submission were also made available.

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WEB APPENDIX TO PAPER

A full list of data sources used in the paper appears below ¹⁻²⁶

Figure A1: Total attendances, January 2011-2015, NHS England. Note: axis does not start at 0.

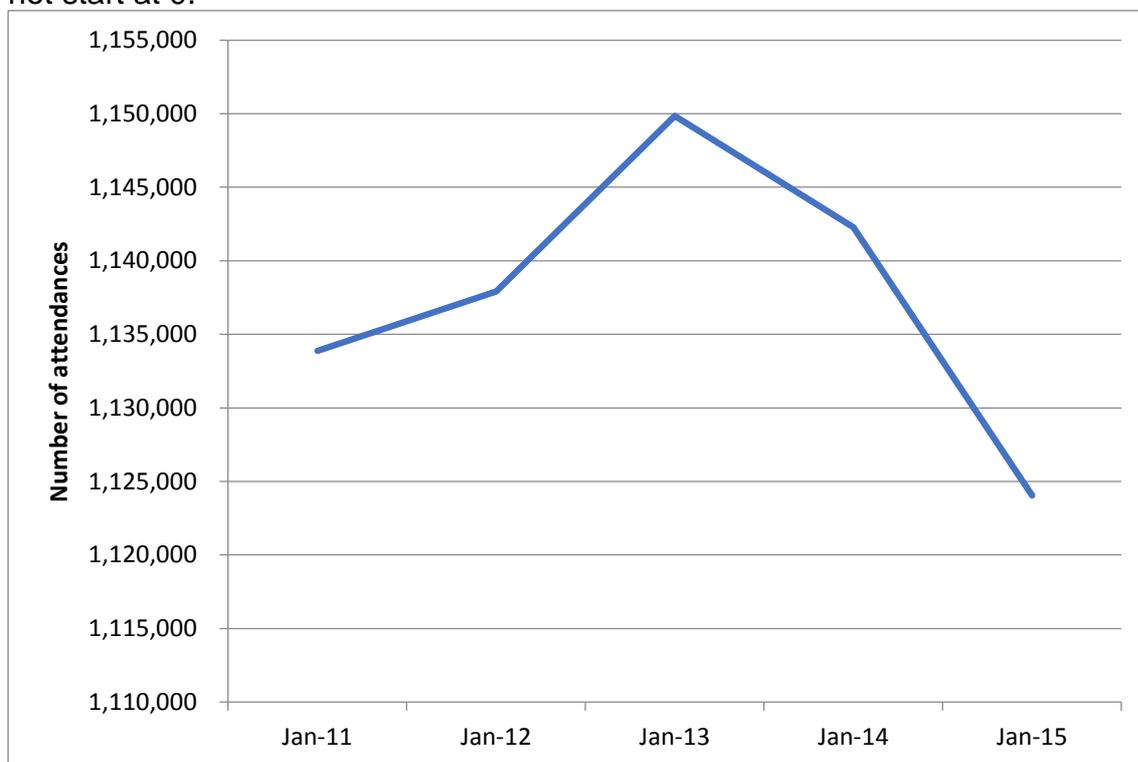
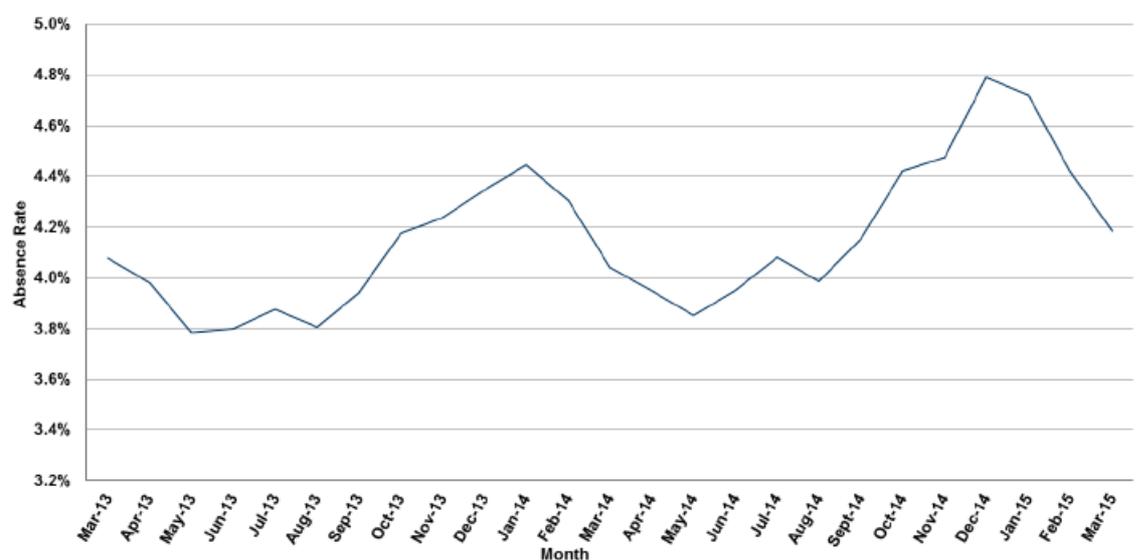


Figure A2: Staff absence rates in the NHS in England. Note: axis does not start at 0.



Source: HSCIC¹¹

These figures correspond to areas of NHS performance examined for January 2015. Figure 1 shows that attendances to A&E in this period were not exceptional, indeed lower than the same time periods from 2011. Figure 2 shows an increase in staff absences rates in the NHS in England during that period. In combination with the other markers presented in the paper, these appear to represent a whole system failure in January 2015.

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