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Did austerity cause the rise in deaths seen in England and Wales in 2015?

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Abstract

Several recent studies have suggested that austerity led to higher deaths in England and Wales in 2015. There are several key observations which argue against this conclusion. The rise in deaths also occurred in Scotland, Wales and Northern Ireland where health and social care is integrated, and did not suffer the degree of austerity imposed on adult social care in England. In addition, there is no apparent relationship between local authority deprivation score and the increase in deaths in 2015. Austerity cannot explain those local authorities which showed a reduction in deaths in 2015. Deaths across Europe likewise displayed a significant increase in 2015, which appears linked to events leading up to a spike in deaths in January 2015. This initiated ongoing effects on mortality and morbidity. Deaths also show on/off switching in all countries so far studied, and show additional diversity at sub-local government geographies. The single-year-of-age patterns in mortality observed in one of the studies contradicts a general effect due to austerity, and has been reported elsewhere. These patterns may arise from' original antigenic sin' and if so this would suggest an infectious aetiology. Increased hospital bed occupancy for certain conditions also appears to characterise this and previous events.

Key Words: Austerity, mortality, deprivation, social care budgets, trends

Key Points

- Austerity is unlikely to be the primary reason for increased deaths in 2015
- A similar rise in deaths also occurred in Scotland, Wales and Northern Ireland where health and social care are integrated, and have not suffered the degree of austerity imposed on adult social care in England
- Similar large increases in 2015 were repeated across European countries
- Across many countries deaths show on/off switching, and 2015 was an 'on' year
- The patterns of death show sub-local authority diversity
- Single-year-of-age patterns in mortality contradict general austerity, and have been reported elsewhere in both medical admissions and deaths.
- Hospital bed occupancy for certain conditions rose during this and previous events

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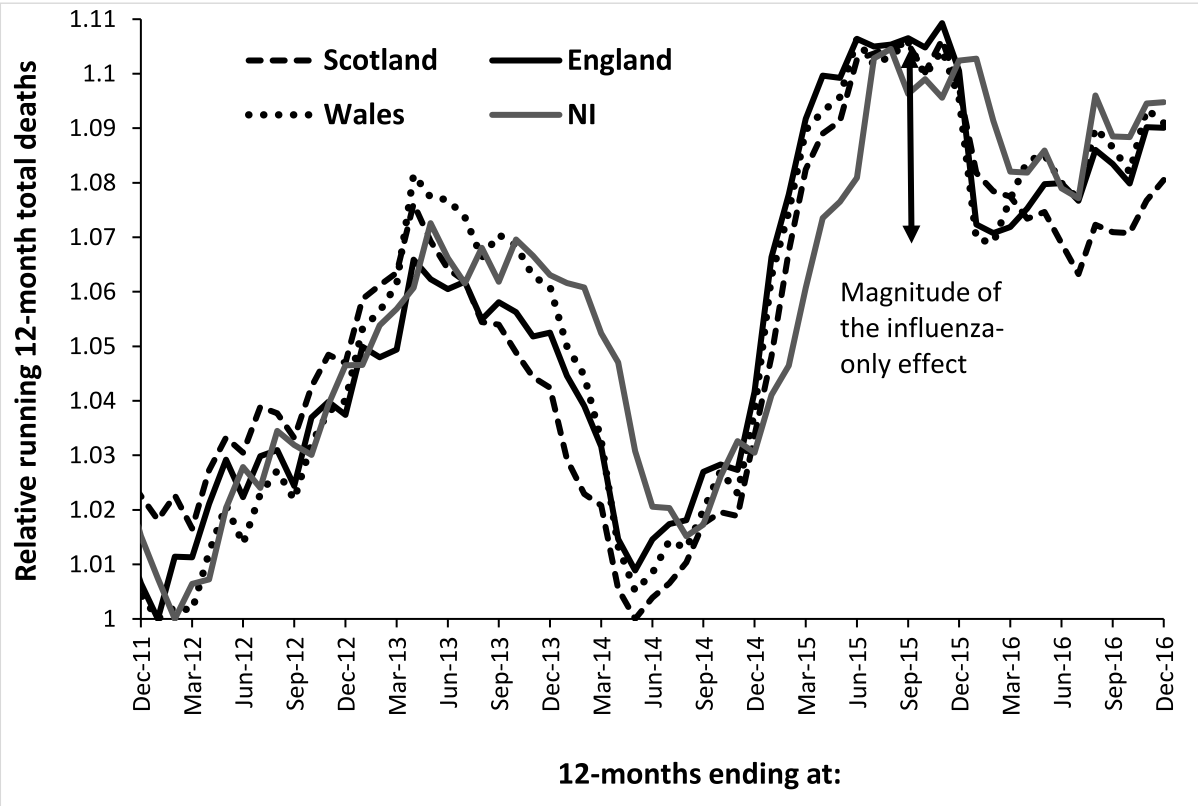
Introduction

The end-of-life is preceded by a period of declining self-rated health and increasing dependence (Stenholm et al 2015, Kalbarczyk-Steclik & Nicinska 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 (Beeknoo & Jones 2016).

A recent review of the factors influencing hospital bed occupancy has concluded that end-of-life represents a significant contribution to the marginal changes in bed occupancy. The same study established that occupied beds rose and fell in parallel with all-cause mortality (Beeknoo & Jones 2016). Hence anything capable of influencing deaths will have a major impact on both health and social care costs. The large rise in deaths in 2015 has led to several studies suggesting that austerity may be the principle cause (Loopstra et al 2016, Hiam et al 2017a,b, Green et al 2017). Given the huge implications of these claims to government policy, further examination of these conclusions is warranted. Both these (Hiam et al 2017a,b, Green et al 2017) and the previous study (Loopstra et al 2016) contain several potential flaws which need to be explored in greater detail.

Figure 1: Trend in deaths in the four countries of the UK



Footnote: Monthly data for England and Wales obtained from Office for National Statistics, Northern Ireland Statistical Research Agency and National Records of Scotland.

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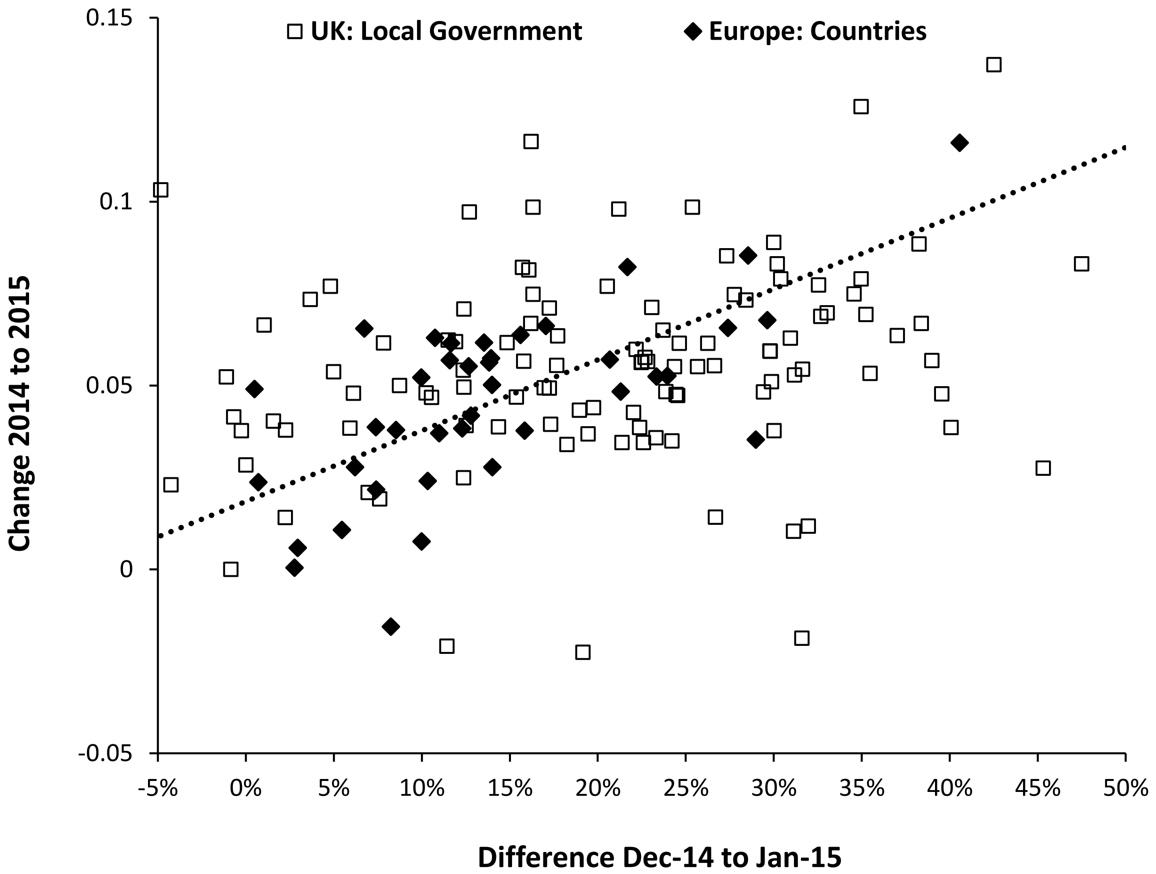
On/Off Switching

The recent studies of Hiam et al (2017a,b) and Green et al (2017) used calendar year totals to investigate a large difference between total deaths in 2015 versus 2014. However, the situation is far more complex than that apparent using simple calendar year totals. In this respect, Figure 1 uses a running (moving) 12-month total based on monthly data for the four countries comprising the UK. In a running total on/off switching, i.e. deaths stay high for 12 months followed by a switch back to low deaths, shows itself as a saw-tooth pattern. This saw-tooth pattern is evident in international trends (Jones 2015a-d), and more importantly occurs at very small areas and is replicated in emergency admissions, the gender ratio at birth, stillbirths and certain congenital malformations (Jones 2015c, 2016b, 2017a). On/off switching only arises in the presence of a recurring effector. Austerity is progressive and should therefore generate a roughly continuous trend.

The on/off switching has not been previously reported, presumably because no one thought it was possible.

Figure 2: Change in deaths between December 2014 and January 2015 and difference in total deaths between 2014 and 2015 for UK local authority areas and countries across Europe.



Footnote: Monthly data for England and Wales from Office for National Statistics, monthly data for Scotland from National Records of Scotland, monthly and annual data across Europe from eurostat (Deaths (total) by month, updated 02-30-2017). Data in this figure excludes any country or local government area with less than 2,000 deaths in 2014.

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Austerity Exceptions

Both the previous and more recent studies (Loopstra et al 2016, Hiam et al 2017a,b, Green et al 2017) focussed on England and Wales. Is the same behaviour also observed in Scotland and Northern Ireland? As can be seen in Figure 1 both Northern Ireland and Scotland experienced an identical increase in deaths in 2015 to that seen in England and Wales. Part of the increase is due to an influenza outbreak in late 2014 which has been proposed to exhibit interaction between influenza and another (presumed) infectious agent (Jones 2017b).

However, the key point is that health and social care are integrated in Northern Ireland and Scotland, and as far as can be discerned neither has experienced the extent of financial austerity inflicted on adult social care in English local authorities (HM Treasury 2016). Clearly something other than simple austerity is at work.

Repeated Across Europe

The arrangement of health and social care and of funding is vastly diverse across Europe, however, significant increases in deaths in 2015 compared to 2014 were repeated across most of Europe. This is illustrated in Figure 2 where the change in deaths between 2014 and 2015 across Europe and in UK local government areas is compared to the magnitude of an unexpected increase in deaths in January 2015 compared to December 2014. As can be seen the magnitude of the change between 2014 and 2015 is largely predicated by the events leading to the spike increase in deaths in January 2015. Recall that in a running (moving) 12-month total a spike increase generates a table-top shaped feature, i.e. the spike month enters the running total, stays there for 12 months and then exits the running total.

It has been suggested that whatever led to the large spike in January 2015 seemingly arose from an interaction between a presumed infectious agent and a seemingly innocuous influenza outbreak in late 2014 (Jones 2017b). This interaction was seemingly magnified by previous vaccination of the world population with an antigen mix which did not match with that of mutated strains of influenza. These mutated strains unfortunately arose after the antigen mix had been determined by the WHO (Jones 2017b).

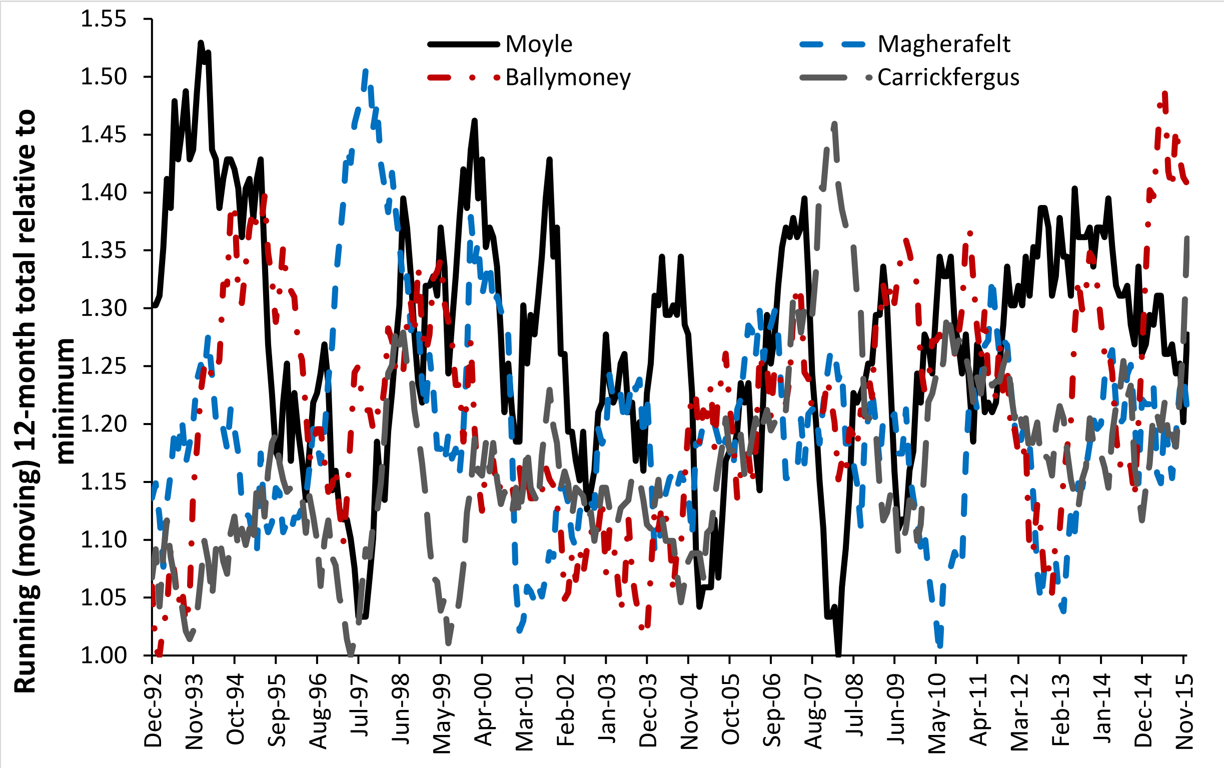
Hence whatever happened in England and Wales in 2015 was repeated elsewhere and cannot be ascribed to local austerity.

Small Area Exceptions

While such high-level analysis at whole country level is useful, it has been repeatedly observed that the national picture is a composite picture derived from local small-area behaviours (Jones 2015b,d, 2016d, 2017a,b).

Both national and international trends in deaths show high variation even in local government areas lying within proximity to one another. Figure 3 gives an example from Northern Ireland where these exceptions go back many years. In addition, one area can show maximum deaths while another is experiencing a minimum. For example, the local government areas of Moyle and Carrickfergus are usually out-of-phase, i.e. deaths are high when deaths in other local government areas are low. Such phase shifts are not unknown to occur in infectious outbreaks (Lewnard and Townsend 2016). This out-of-phase behaviour leads to a considerable reduction in the 'apparent' magnitude of these events observed at national level (Jones 2016b, 2017c)

Figure 3: Trend in deaths for local government areas in Northern Ireland



Footnote: Monthly data from the Northern Ireland Statistical Research Agency

Hence, the fundamental mechanism pre-dates austerity, shows high spatial granularity and out-of-phase or anti-phase behaviour. Such anti-phase behaviour is critical to understanding the events in 2015. Local authority areas in the UK and countries in Europe which experienced a large increase in deaths in 2014 generally do not show any increase in 2015 or show a reduction (Jones 2017c).

Single-year-of-age Patterns

Hiam et al (2017b) also observed a highly unusual single-year-of-age profile in the difference in the mortality rate between 2014 and 2015. They were unable to offer an explanation as to how this unusual behaviour may have arisen from austerity. Such single-year-of-age profiles have been extensively documented to affect both deaths and medical admissions (Jones 2014, Jones 2015a).

Such single-year-of-age profiles are observed in a phenomenon called 'original antigenic sin', and arise when the immune system is primed by repeated exposure to multiple strains of the same infectious agent (Kim et al 2009). This effect only occurs with infectious agents which elicit an immune response. An infectious aetiology is therefore a possible explanation.

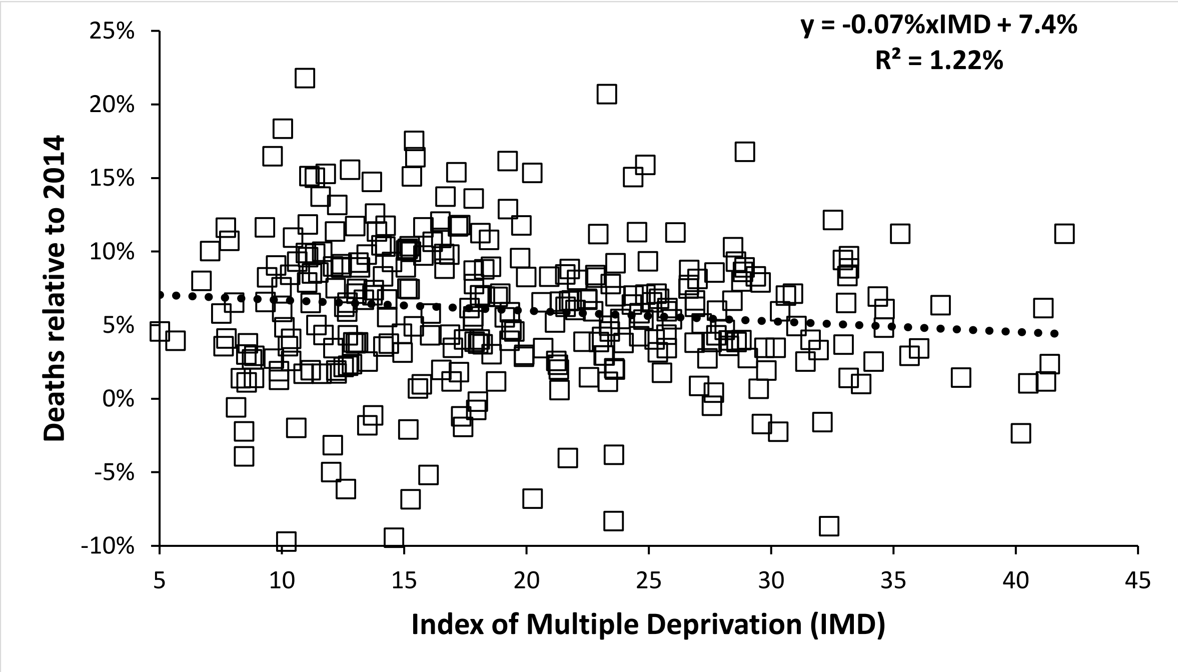
No relationship with Deprivation

Austerity would be expected to affect the most deprived areas. Figure 4 shows the increase in deaths in 2015 relative to 2014 in English local authorities, along with the deprivation score as measured by the Index of Multiple Deprivation (IMD). There are two key points from this figure:

1. Austerity cannot explain the local authority areas which experienced a ***reduction*** in deaths in 2015
2. There is no apparent relationship between the increase in deaths and local authority deprivation score. Indeed, deprivation only explains 1.2% of any trend, i.e. $R^2 = 0.0012$.

We are left to conclude that relative deprivation played no role in the increase in 2015, which is totally contrary to the proposed involvement of reduced social care funding.

Figure 4: Deaths in 2015 compared to 2014 for English Local Authority residents and average deprivation score



Footnote: Monthly deaths by usual area of residence are from the ONS. 2015 deprivations scores using the Index of Multiple Deprivation (IMD) are from https://www.gov.uk/government/statistics/english-indices-of-deprivation-2015

A maximum increase was not restricted to 2015

As demonstrated in Figure 3 for Northern Ireland a maximum step-like increase in deaths was not restricted to 2015 (Jones 2017e). Indeed, for English local authorities over the period 2001 to 2016 some 36% of local authorities experienced a maximum step-like increase in years other than 2015 (Jones 2017e). Like Figure 4 there is no demonstrable relationship between deprivation and the maximum step-like increase between 2001 and 2016 (data not shown).

Increased Morbidity

While austerity may have led to a small increase in deaths, alternate and stronger explanations have already been put forward. It has been suggested that the above behaviour arises from the very small-area spread of a new type of infectious agent (Jones

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2013, 2015a, 2016a, 2017e). The range of diagnoses so affected are indicative of the immune system as a primary target, leading to secondary infections and the exacerbation of existing conditions (Jones 2013, 2016a, 2017a). A list of conditions affected during pregnancy, in neonates and for congenital malformations has been published (Jones 2017a), as has a list of high volume primary diagnoses associated with hospital admissions (Jones 2013).

Table 1: Primary diagnoses of an infectious origin showing an increase during national periods of a presumed infectious outbreak

ICD-10	Description	Bed Days	Increase 1	Increase 2	95% CI
A04	Other bacterial intestinal infections	121,681	25%	0.9%	0.6%
A27	Leptospirosis	492	12%	68%	9.0%
A36	Diphtheria	69	63%	61%	24.2%
A38	Scarlet fever	653	18%	52%	7.8%
A40	Streptococcal septicaemia	25,269	23%	19%	1.3%
A41	Other septicaemia	473,588	18%	36%	0.3%
A43	Nocardiosis	216	150%	114%	13.6%
A48	Other bacterial diseases not elsewhere classified	4,677	13%	1%	2.9%
A49	Bacterial infection of unspecified site	25,752	13%	27%	1.2%
A51	Early syphilis	100	93%	25%	20.0%
A53	Other and unspecified syphilis	108	209%	27%	19.2%
A54	Gonococcal infection	435	36%	27%	9.6%
A56	Other sexually transmitted chlamydial diseases	222	80%	3%	13.4%
A68	Relapsing fevers	18	292%	500%	47.8%
A69	Other spirochaetal infections	596	35%	23%	8.2%
A81	Slow virus infections of central nervous system	3,501	2.6%	18%	3.4%
A84	Tick-borne viral encephalitis	52	337%	415%	27.7%
A85	Other viral encephalitis NEC	884	2%	49%	6.7%
A88	Other viral infections of central nervous system NEC	33	319%	8%	34.7%
B02	Zoster (herpes zoster)	22,720	4%	2%	1.3%
B15	Acute hepatitis A	638	6%	10%	7.9%
B19	Unspecified viral hepatitis	553	11%	15%	8.5%
B22	HIV disease resulting in other specified diseases	3,088	51%	11%	3.6%
B35	Dermatophytosis	727	13%	11%	7.4%
B36	Other superficial mycoses	320	63%	31%	11.2%
B37	Candidiasis	11,298	10%	8%	1.9%
B44	Aspergillosis	8,177	1%	4%	2.2%
B53	Other parasitologically confirmed malaria	136	4%	37%	17.1%
B55	Leishmaniasis	215	26%	15%	13.6%
B74	Filariasis	38	8%	346%	32.3%
D81	Combined immunodeficiencies	3,930	11%	11%	3.2%
D84	Other immunodeficiencies	1,252	15%	106%	5.7%
E55	Vitamin D deficiency	1,508	17%	39%	5.2%
G00	Bacterial meningitis NEC	16,112	10%	6%	1.6%
G04	Encephalitismyelitis and encephalomyelitis	35,613	5%	14%	1.1%
G06	Intracranial and intraspinal abscess and granuloma	33,601	20%	12%	1.1%
G08	Intracranial and intra-spinal phlebitis and thrombophlebitis	4,347	13%	21%	3.0%
H13	Disorders of conjunctiva in diseases classified elsewhere	178	45%	187%	15.0%
J00	Acute nasopharyngitis (common cold)	1,548	18%	24%	5.1%
J02	Acute pharyngitis	6,136	3%	9%	2.6%
J03	Acute tonsillitis	48,367	1.1%	1.6%	0.9%
J04	Acute laryngitis and tracheitis	3,082	3%	8%	3.6%
J12	Viral pneumonia not elsewhere classified	10,898	69%	46%	1.9%
J13	Pneumonia due to Streptococcus pneumoniae	34,278	16%	11%	1.1%
J15	Bacterial pneumonia not elsewhere classified	79,671	12%	1.3%	0.7%
J18	Pneumonia organism unspecified	2,204,895	11%	16%	0.1%
J36	Peritonsillar abscess	10,952	4%	6%	1.9%

There is an alternative way to confirm the presumed infectious/immune involvement. During national level outbreaks of this agent hospital bed occupancy rises. There have been three large outbreaks centred around 2003, 2008 and 2014. Diagnoses associated with higher bed occupancy in these periods can be determined. This method is robust because occupied bed days in the surgical group of specialties has been declining since 2002, while the baseline for medical occupied beds has remained roughly constant (Jones 2017d). Hence any diagnosis which consistently increases across all three outbreaks is of interest.

A range of infectious and other diagnoses can be identified and these are presented in Table 1. Due to a change in the ICD-10 diagnosis codes implemented in 2012 there are two measures of the percentage increase in occupied bed days, with “Increase 1” referring to the two events prior to 2012 and “Increase 2” referring to that after 2012 (see Jones 2017a for more detail).

As can be seen from Table 1 occupied bed days across a range of infectious diagnoses do indeed increase. This increase is a mix of increased admissions and increased complexity (Jones 2013). There is no suggestion that the incidence of the various infections have increased per se, however, the severity of these infections has increased leading to increased hospitalization. For this reason, several other diagnoses are included in Table 1 relating to immune function such as ICD D81, D84 and E85, some inflammatory conditions such as G04, G06 and G08 and some common respiratory infections such as J00-J36.

Something keeps recurring leading to an increase in bed occupancy consistent with a proposed infectious/immune aetiology.

Conclusion

The real cause of the increased deaths may well be far more ominous than any increase arising from austerity. We need to ask the question as to whether policy-based evidence has contributed to limited awareness to these issues (Beeknoo & Jones 2017)?

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