Office for National Statistics

Statistical bulletin

Deaths involving Clostridium difficile, Wales: 2013

Deaths where Clostridium difficile infection was mentioned on the death certificate by sex, age group and whether the death occurred in hospital or elsewhere.

Contact:
Andrew Tooley
mortality@ons.gsi.gov.uk

Release date:
3 September 2014

Next release:
To be announced

Table of contents

1. Key points

- In 2013, there were 177 deaths involving Clostridium difficile (C. difficile) in Wales, 22 more than in 2012 (155 deaths)
- Of the 177 deaths involving C. difficile, 91 were also the underlying cause of death; an increase of 11% on 2012 (82 deaths)
- The age-standardised mortality rate for deaths involving C. difficile of 58.4 per million population in 2013 is a significant increase since 1999 (22.6 per million population), the start of the time series. However, it is a significant fall from the peak in 2008 (164.8 per million population)
- C. difficile deaths increase with age and were highest among those aged 85 years and over. During 2011–13 the age-specific mortality rate for people aged 85 years and over was 1,467.4 per million population for males and 1,157.9 per million population for females
- The number of deaths involving C. difficile has remained consistently higher in females than males since 1999

2. Summary

This bulletin presents the latest figures for deaths where C. difficile was mentioned or was identified as the underlying cause or as a contributory cause of death on death certificates. Figures are presented for Wales and broken down by sex, age group and place of death. Comparisons are made between data for 2013 and previously published data from 1999 onwards. Information is given about the context and use of the statistics, and the methods used to produce them.

Figures are based on deaths registered in each calendar year, rather than those occurring in each year. Since the majority of deaths involving C. difficile registered in 2013 also occurred in the same year, registration delays are unlikely to have an impact on the findings. Please see the section on registration delays for further information.

Two important changes have been made to ONS's reporting of C. difficile deaths. Firstly, the scope of the annual bulletin has been reduced. Beginning with 2013, the bulletin will only cover Wales rather than England and Wales, with production costs being jointly funded by Public Health Wales NHS Trust and the Welsh Government. This follows the response to ONS's Consultation on proposed cuts a number of statistical outputs, required as funding has been reduced. The second change is methodological in nature and involves the use of the recently implemented 2013 European Standard Population (2013 ESP) in calculating age-standardised rates. This new standard population replaces the 1976 ESP which no longer reflects the age distribution of the population in Europe. Historical data from 1999 onwards have been rebased on the 2013 ESP. Further information on this change is available in the 'Impact of the 2013 European Standard Population' section.

3. Impact of the 2013 European standard population

The ESP has become an accepted methodological standard in health statistics in the UK and the rest of Europe, and is used in the calculation of age-standardised rates by ONS, other government departments, the NHS and academic health researchers. The ESP used in the previous publications of C. difficile statistics was first introduced in 1976, but is no longer representative of the age-structure of the population of European Union Member States. Due to this, Eurostat implemented a new version of the ESP in 2013. Also, ONS, on behalf of the Government Statistical Service, has carried out a public consultation on how to implement the new ESP in the UK.

The 2013 ESP takes into account changes in the EU population, providing a more current, methodologically sound and widely acceptable basis for calculating age-standardised rates (Eurostat, 2013). The 1976 and 2013 ESPs differ in two ways. Firstly, the 2013 ESP gives the populations in older age groups greater weighting than the 1976 ESP. Secondly, the age distribution of the 1976 ESP has an upper limit of 85 years and over, while the 2013 ESP includes age groups 85-89, 90-94 and 95+.

An ONS report examining the impact of the change in ESP on mortality data showed that sex-specific rates for causes where deaths predominantly occur at older ages are significantly higher under the 2013 ESP, compared to the 1976 ESP. This is because the larger number of older people in the 2013 ESP exerts more influence on these rates than the 1976 ESP. Since deaths involving C. difficile occur mainly at older ages, the rates presented here are greater in magnitude than those previously published using the 1976 ESP for the same periods. However, it is important to note that the difference between death rates based on the old and new ESP is purely methodological, and does not indicate an actual increase in the previously published numbers of death or death rates.

4. Background

Clostridium difficile (C. difficile) is a spore forming anaerobic bacterium that was first described in the 1930s (Hall and O'Toole, 1935). It is present in the gut of up to 3% of healthy adults but rarely causes any harm (Public Health Wales, 2010).

C. difficile can cause illness or become life-threatening when certain antibiotics disturb the balance of bacteria in the gut. If it overgrows in the gut, the toxins it produces can cause illness ranging from that with no symptoms, to diarrhoea of varying severity, through to severe life-threatening inflammation of the bowel. The diarrhoea associated with C. difficile may resolve once sufferers stop antibiotic treatment. People over the age of 65 years are at greater risk of contracting C. difficile. Over 80% of cases are reported in this age group (Public Health Wales, 2010).

C. difficile is often referred to as a healthcare-associated infection (HCAI). HCAIs can develop either as a direct result of healthcare interventions (such as medical or surgical treatment) or from being in contact with a health or social care setting (including healthcare delivered in the community). HCAIs may also be contracted outside a healthcare setting and brought in by patients, staff or visitors and then transmitted to others (National Institute for Health and Care Excellence, 2014).

In Wales, surveillance of C. difficile is managed by the Welsh Healthcare Associated Infection Programme (WHAIP), which is part of Public Health Wales. The latest figures for April 2013 to March 2014 (2013/14) show there were 1,577 cases reported in hospital inpatients in Wales (Public Health Wales, 2010). This is a decrease of 23% from the 1,934 cases reported in 2012/13.

5. Results

Tables within this bulletin contain data for the latest periods for ease of presentation. However, time trends are examined from 1999 onwards.

6. Deaths involving C. difficile

In 2013, there were 177 deaths involving C. difficile, an increase of 14% (155 deaths) from 2012. This was the first increase since 2008, when the number of deaths peaked at 461. Prior to 2008, there was a steady increase in deaths from 1999. There was no change for males as 69 deaths were registered in both 2012 and 2013. For females, deaths mentioning C. difficile increased by 26% from 86 in 2012 to 108 in 2013.

While C. difficile may contribute to a death, sometimes it is also directly responsible for causing it. In 2013, of the 177 death certificates mentioning C. difficile, 91 (51%) also said it was the underlying cause of death. Deaths caused by C. difficile increased by 11% from 2012 to 2013, from 82 to 91. Of the 69 death certificates that mentioned C. difficile among males, 34 (49%) recorded it as the underlying cause of death. Of the 108 female deaths mentioning C. difficile, 57 (53%) recorded it as the underlying cause of death.

There were more female deaths involving C. difficile (including as the underlying cause) than male deaths in each year between 1999 and 2013 (see Reference table 1).

Table 1: Number of death certificates with Clostridium difficile mentioned and as the underlying cause of death, Wales, deaths registered between 2009 and 2013

Wales

Numbers, %

	2009	2010	2011	2012	2013
Certificates mentioning C. difficile	381	368	236	155	177
Certificates where C. difficile was the underlying cause of death	201	184	118	82	91
Percentage of mentions selected as underlying cause	52.8	50.0	50.0	52.9	51.4

Source: Office for National Statistics

Notes:

1. Deaths involving clostridium difficile are defined using a combination of any mention of International Classification of Diseases, Tenth revision (ICD 10) codes A04.7, A05.8, A41.4, A48.0, A49.8 or P36.5 anywhere on the death certificate and mention of C difficile or related conditions in the text of the death certificate. Details of the methods used can be found in the ‘Definitions’ tab of this worksheet.

2. The underlying cause of death is defined using the International Classification of Diseases, Tenth revision (ICD 10) The codes used to identify deaths where C. difficile was the underlying cause of death (on deaths where C. difficile was mentioned) are A04.7, A09, A41.4 and A49.8.

3. Deaths where C. difficile was the underlying cause exclude neonatal deaths.

4. Figures are based on geographical boundaries as of May 2014. Data for Wales excludes deaths of non-residents.

5. In 2013 the average number of days between date of death and death registration was three days for C. Difficile.

7. Age-specific mortality rates for deaths involving C. difficile

The majority of deaths involving C. difficile are among older people. Table 2 shows that the age-specific mortality rate increases with age. For the 2011–13 period, mortality rates were highest in those aged 85 years and over, and lowest in those aged under 55 years. Age-specific rates in these two age groups were 1,258.9 and 1.4 per million population respectively.

Older people are more vulnerable to C. difficile infection as they are likely to have relatively weaker immune systems compared to younger people, and to have other underlying problems. They are also more likely to be hospitalised, exposed to long-term care facilities or prescribed antibiotics, thereby increasing their chances of infection (Owens et al., 2008).

For males aged 85 years and over, the age-specific mortality rate was 1,467.4 per million population. For females, it was 1,157.9 per million population. Conversely, age-specific rates were the lowest in those aged under 55 years: 1.6 and 1.3 per million population for males and females respectively. Compared with 2008–10, age-specific rates were significantly lower in 2011–13 in those aged 85 years and over. The age-specific rates for those aged over 85 in 2008–10 were 2,581.8 per million population for males and 2,777.1 per million population for females.

Table 2: Mortality rates for deaths where Clostridium difficile was mentioned on the death certificate, by age and sex,Wales, deaths registered in periods 2008–10 and 2011–13

Wales

Rates (per million population)

	2008-10			2011-13		
	Males	Females	Persons	Males	Females	Persons
Under 55	2.2*	2.5*	2.4*	1.6*	1.3*	1.4*
55-64	26.0*	40.3	33.2	22.9*	11.9*	17.3*
65-74	194.8	153.1	173.2	78.1	63.3	70.5
75-84	801.0	713.9	751.3	284.7	346.8	319.4
85 and over	2,581.8	2,777.1	2,716.3	1,467.4	1,157.9	1,258.9

Source: Office for National Statistics

Notes:

1. Deaths involving clostridium difficile are defined using a combination of any mention of International Classification of Diseases, Tenth revision (ICD 10) codes A04.7, A05.8, A41.4, A48.0, A49.8 or P36.5 anywhere on the death certificate and mention of C difficile or related conditions in the text of the death certificate.Details of the methods used can be found in the ‘Definitions’ tab of this worksheet.

2. Age-specific mortality rate per million population.

3. Rates calculated from fewer than 20 deaths are shown with an *.

4. Figures are based on geographical boundaries as of May 2014. Data for Wales excludes deaths of non-residents.

5. In 2013 the average number of days between date of death and death registration was three days for C. Difficile.

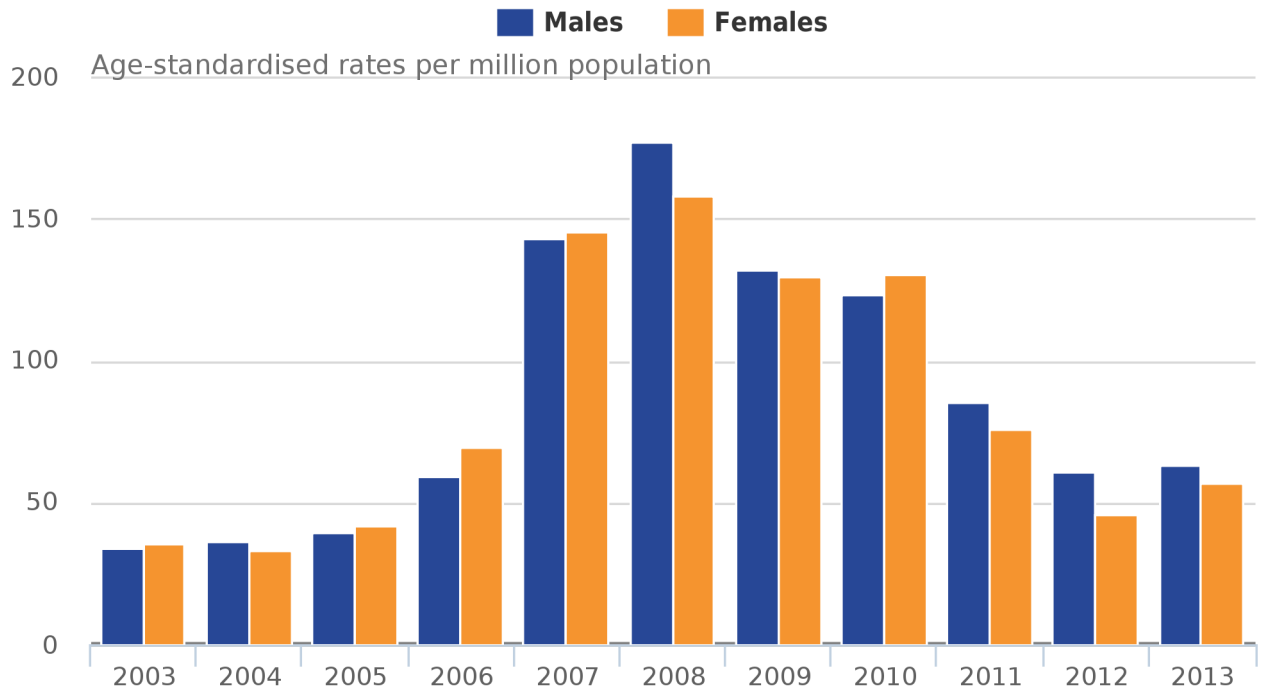
8. Age-standardised rates for deaths involving C. difficile

Between 1999 and 2008, there was a steady increase in age-standardised rates for males. The rate increased from 18.8 per million population to 177.2 per million population between 1999 and 2008. This was similar to the rates for females, which in 1999 was 24.2 per million population, and peaked at 157.9 per million population in 2008.

Since 2008 there has been a steady decrease in age-standardised rates. In 2013 the rates were 63.3 and 57.3 per million population for males and females respectively.

Figure 1: Mortality rates for deaths involving Clostridium difficile by sex, Wales, deaths registered between 2003 and 2013

Wales



Source: Office for National Statistics

Notes:

1. Deaths involving C. difficile are defined using a combination of any mention of International Classification of Diseases, Tenth revision (ICD 10) codes A04.7, A05.8, A41.4, A48.0, A49.8 or P36.5 anywhere on the death certificate and mention of C. difficile or related conditions in the text of the death certificate. Details of the methods used can be found in the ‘Methods’ section

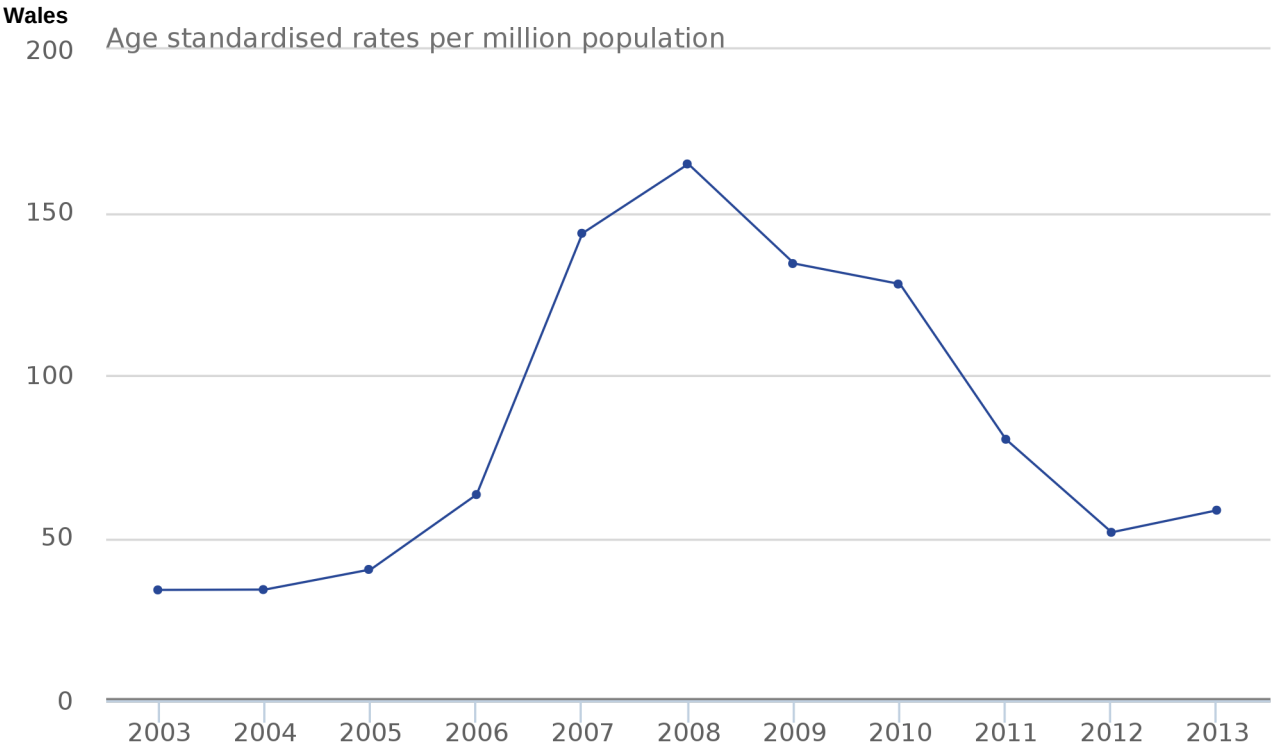
2. The age-standardised mortality rates per million population in this bulletin were calculated using the 2013 European Standard Population. Age-standardised rates are used to allow comparison between populations which may contain different proportions of people of different ages

3. Figures are based on geographical boundaries as of May 2014. Data for Wales exclude deaths of non-residents

4. In 2013 the average number of days between date of death and death registration was three days for C. difficile

The age-standardised mortality rate for deaths involving C. difficile among all persons was 58.4 per million population in 2013. This is a significantly higher than the rate in 1999 (22.6 per million population), the start of the time series. However, it is a significant fall from the peak in 2008 (164.8 per million population) (see Figure 2).

Figure 2: Mortality rates for deaths involving clostridium difficile, Wales, deaths registered between 2003 and 2013



Source: Office for National Statistics

Notes:

1. Deaths involving C. difficile are defined using a combination of any mention of International Classification of Diseases, Tenth revision (ICD 10) codes A04.7, A05.8, A41.4, A48.0, A49.8 or P36.5 anywhere on the death certificate and mention of C. difficile or related conditions in the text of the death certificate. Details of the methods used can be found in the ‘Methods’ section.

2. The age-standardised mortality rates per million population in this bulletin were calculated using the 2013 European Standard Population. Age-standardised rates are used to allow comparison between populations which may contain different proportions of people of different ages.

3. Figures are based on geographical boundaries as of May 2014. Data for Wales exclude deaths of non-residents.

4. In 2013 the average number of days between date of death and death registration was three days for C. difficile.

9. Place of death

In the period 2011–13, deaths involving C. difficile accounted for 0.6% of all deaths registered in Wales.

A breakdown by place of death shows that 94% of deaths involving C. difficile in Wales occurred in NHS hospitals. Deaths involving C. difficile represent 1% of all deaths in NHS hospitals.

As the majority of deaths in Wales occur in NHS hospitals, it is expected that the proportions of deaths involving C. difficile in these would be higher than those in other establishment types.

In general, care homes had the second highest percentage (4%) of all deaths involving C. difficile. This increased from 2% in 2008–10 to 4% in 2011–13. The majority of these deaths occurred in care homes not administered by local authorities.

Table 3: Proportion of deaths involving Clostridium difficile occurring in selected communal establishments, Wales, deaths registered in periods 2008–10 and 2011–13

Wales

%

	2008-10	2011-13
All C. Difficile deaths	100.0	100.0
Hospital (NHS)	95.3	94.2
Care home	2.1	3.5
Home	1.9	1.2
Hospice	0.2	0.7
Other	0.4	0.4

Source: Office for National Statistics

Notes:

1. Deaths involving clostridium difficile are defined using a combination of any mention of International Classification of Diseases, Tenth revision (ICD 10) codes A04.7, A05.8, A41.4, A48.0, A49.8 or P36.5 anywhere on the death certificate and mention of C difficile or related conditions in the text of the death certificate. Details of the methods used can be found in the ‘Definitions’ tab of this worksheet.

2. Figures for Wales include deaths of non-residents.

3. In 2013 the average number of days between date of death and death registration was three days for C. Difficile.

4. Deaths at home are those at the usual residence of the deceased (according to the informant) , where this is not a communal establishment.

5. Care homes includes homes for the chronic sick; nursing homes; homes for people with mental health problems and non-NHS multi function sites.

6. NHS hospitals include multifunction sites and military hospitals and exclude psychiatric hospitals.

7. Hospice includes all NHS and non-NHS hospices.

8. Other include schools for people with learning disabilities, holiday homes and hotels, common lodging houses, aged persons’ accommodation, assessment centres, schools, convents and monasteries, nurses’ homes, university and college halls of residence, young offender institutions, secure training centres, detention centres, prisons and remand homes.

9. Other also includes all places not covered above such as deaths on a motorway, at the beach, climbing a mountain, walking down the street, at the cinema, at a football match, while out shopping, or in someone else's home. This category also includes people who are pronounced dead on arrival at hospital.

10. Registration delays

The information used to produce mortality statistics is based on the details collected when deaths are certified and registered. In Wales, deaths should be registered within five days of the death occurring, but there are some situations which result in the registration of the death being delayed. Deaths considered unexpected, accidental or suspicious will be referred to a coroner, who may order a post-mortem or carry out a full inquest to ascertain the reasons for the death.

Statistics on deaths involving C. difficile are presented based on the number of deaths registered in each calendar year, rather than the number of deaths that actually occurred in that year. This method is used because there is a requirement for consistent and timely data, despite a potential limitation in data quality if registrations are delayed.

In 2013, the average (median) registration period for deaths mentioning C. difficile and where it was identified as the underlying cause of death was three days. The majority of deaths mentioning C. difficile and those identifying it as the underlying cause were registered within five days (77% and 70% respectively), while 88% and 86% were registered within 30 days.

Since the majority of deaths involving C. difficile registered in 2013 (90%) also occurred in the same year, registration delays are likely to have no impact on the findings in this bulletin.

11. Results on the Office for National Statistics website

Figures for deaths involving C. difficile from 1999 to 2013 can be found in the reference table on the ONS website. This Excel workbook contains the following results for Wales:

- Number of death certificates with Clostridium difficile mentioned and as the underlying cause of death, Wales, deaths registered between 1999 and 2013
- Age-standardised mortality rates (with 95% confidence limits) for deaths where Clostridium difficile was mentioned on the death certificate, by sex, Wales, deaths registered between 1999 and 2013
- Number of deaths where Clostridium difficile was mentioned on the death certificate by place of death, Wales, deaths registered in 2008–10 and 2011–13
- Age-specific mortality rates (with 95% confidence limits) for deaths where Clostridium difficile was mentioned on the death certificate, by age and sex, Wales, deaths registered in 2008–10 and 2011–13

12. Methods

The information used in this bulletin is based on the details collected when deaths are certified and registered. All deaths are coded by ONS according to the International Classification of Diseases (ICD) produced by the World Health Organisation (WHO). In the Tenth Revision (ICD-10), there is a specific code (A04.7) for ‘Enterocolitis due to Clostridium difficile’. While this code identifies the vast majority of deaths involving C. difficile, a small number of C. difficile-related deaths are not captured by this code alone.

Since 1993, ONS has stored the text of death certificates on a database, along with all the ICD coding relating to causes identified on the death certificate. This means that it is possible to identify records where C. difficile is mentioned, but is not coded under the specific ICD-10 code. The Tenth Revision of ICD (ICD-10) has been used to code deaths in Wales since 2001.

In addition to extracting all deaths related to the specific A04.7 ICD-10 code, deaths mentioning other codes to which diseases including C. difficile could be coded were also extracted. The text of these death certificates was searched manually for mentions of Clostridium difficile, C. difficile or pseudomembranous colitis. The ICD-10 codes used to select deaths in order to search manually are shown in Box 1.

Deaths registered in 1999 were coded to both ICD–9 and ICD–10 as part of a special study to compare the two ICD revisions, and have therefore been used to give an additional year of data on deaths involving C. difficile.

Box 1 Specific and non-specific ICD-10 codes related to C. difficile

Specific codes[1]	Non-specific codes[1]
A04.7 (Enterocolitis due to Clostridium difficile)	A05.8 (Other specified bacterial food borne intoxications)
	A41.4 (Septicaemia due to anaerobes, excludes gas grangene)
	A48.0 (Gas gangrene: Clostridial; cellulitis, myonecrosis)
	A49.8 (Other bacterial infections of unspecified site)
	P36.5 (Sepsis of newborn due to anaerobes)

Notes:

1. Codes used to identify deaths where C. difficile was the underlying cause of death (on deaths where C. difficile mentioned): A04.7, A09, A41.4 AND A49.8.

Deaths with an underlying cause of C. difficile were identified by selecting those deaths with a mention of C. difficile that also had an underlying cause of one of the following ICD-10 codes: A04.7, A41.4 and A49.8. Death certificates that mention C. difficile and record the code A09 (diarrhoea and gastroenteritis of presumed infectious origin) as the underlying cause of death are also taken to indicate that C. difficile was the underlying cause of death.

Since 1986, ONS has used the internationally recommended death certificate for neonatal deaths (infants under 28 days). This certificate was only designed to record all conditions found at death. This means that neonates cannot be assigned an underlying cause of death. However, as the data were based on deaths where C. difficile or pseudomembranous colitis were mentioned on the death certificate, neonates have been included. Neonatal deaths were extracted in the same way as described above.

Modifications to standard error and confidence interval calculations

The mortality data in this release are not subject to sampling variation as they were not drawn from a sample. However, they may be affected by random variation, particularly where the number of deaths or probability of dying is small. To help assess the variability in the rates, they have been presented alongside 95% confidence intervals.

Traditionally, a normal approximation method has been used in calculated confidence intervals on the assumption that C. difficile deaths are normally distributed. However, the annual number of deaths involving C. difficile is relatively small (usually fewer than 100), and may be assumed to follow a Poisson probability distribution. In such cases, it is more appropriate to use the confidence limit factors from a Poisson distribution table to calculate the confidence intervals, instead of a normal approximation method.

For age-standardised rates, the method used in calculating confidence intervals for rates based on fewer than 100 deaths was proposed by Dobson et al., (1991) as described in APHO, (2008). For age-specific rates, the exact Poisson limit factor for the age-specific number of deaths was used to calculate 95% confidence intervals where there were fewer than 100 deaths in a particular age group.

Conversely, for both age-standardised and age-specific rates, normal approximation methods were used to calculate 95% confidence intervals where there were 100 or more deaths.

Full details of all the methodological changes in this bulletin will be published in the Quality and Methodology information note for 'Deaths involving Clostridium difficile' (404.6 Kb Pdf) at a later date.

13. Clostridium difficile statistics for other countries

This statistical bulletin presents figures for C. difficile deaths in Wales. Clostridium difficile deaths in Scotland are published by National Records of Scotland and 'Deaths registered with Clostridium difficile mentioned on the death certificate in Northern Ireland' is published by the Northern Ireland Statistics and Research Agency.

14. References

Association of Public Health Observatories (2008). Technical Briefing 3: Commonly Used Public Health Statistics and their Confidence Intervals. [accessed 4 August 2014].

Department of Health (2005) CMO Update, Issue 42, Summer 2005. [accessed 4 August 2013].

Department of Health and Public Health England (2009) Clostridium difficile infection: how to deal with the problem. [accessed 4 August 2014].

Dobson A, Kuulasmaa K, Eberle E and Scherer J (1991). Confidence intervals for weighted sums of Poisson parameters. Stat Med., 10:457-62. [accessed 4 August 2014].

Hall, I.C and O'Toole, E. (1935) 'Intestinal flora in new-born infants: with a description of a new pathogenic anaerobe, Bacillus difficilus', American Journal of Diseases in Childhood 49 pp 390–402.

National Institute for Health and Care excellence (2013) Prevention and control of healthcare associated infections: Quality improvement guide. [accessed 4 August 2014].

National Records of Scotland (2014). Clostridium difficile Deaths. [accessed 14 August 2014].

Northern Ireland Statistics and Research Agency (2013). Deaths Registered with Clostridium Difficile Mentioned on the Death Certificate. [accessed 15 August 2014].

Owens RC, Donskey CJ, Gaynes RP, Loo VG and Muto, CA. (2008). Antimicrobial-Associated Risk Factors for Clostridium difficile Infection. Clinical Infectious Diseases 46: S19-S31. [accessed 9 August 2014].

Public health Wales (2010) Clostridium difficile. [accessed 9 August 2014].

Public Health Wales (2013) All Wales clostridium difficile surveillance reports. [accessed 9 August 2014].

15. Background notes

1. **Mortality metadata**

   Statistics on mortality are derived from the information provided when deaths are certified and registered. Information about the underlying mortality data, including details on how the data is collected and coded are available in the mortality metadata (2.7 Mb Pdf) . Further information about the methods and quality of these statistics can be found in the Quality and Methodology Information reports for Mortality Statistics and Deaths involving Clostridium difficile in Wales which are available on the ONS website (404.6 Kb Pdf) .

2. **Deaths involving C. difficile**

   The number of deaths due to C. difficile is difficult to estimate. Trends in mortality are usually monitored using the underlying cause of death (the disease which initiated the train of events leading directly to death). However, C. difficile (and other healthcare associated infections) are often not the underlying cause of death. Those who die with C. difficile are usually patients who were already very ill, and it is their existing illness which is often given as the underlying cause of death. There is interest in the number of deaths where C. difficile contributed to the death – only conditions which contribute directly to the death should be recorded on the death certificate. Results presented in this bulletin identify deaths where the underlying cause was C. difficile and also where C. difficile was mentioned as the underlying cause of or as a contributory factor in the death.

3. **Healthcare associated infections**

   Although C. difficile is commonly referred to as a healthcare associated infection, it is not possible to state from the information on a death certificate where the infection was acquired, nor can assumptions be made about quality of care. People are often transferred between hospitals, care homes and other establishments, and may acquire infections in a different place to where they died.

4. **Death certification**

   Guidance on death certification, with specific reference to healthcare associated infections, was issued to doctors in May 2005 (revised in 2010). This was followed by a message from the Chief Medical Officer to all doctors reminding them of their responsibilities with respect to death certification and drawing their attention to the guidance (Department of Health, 2005). More recently, the Department of Health and Public Health England (2013) released a report detailing good practice and recommendations on completing death certificates for deaths involving C. difficile.

5. **European standard population**

   This bulletin presents age-standardised (also known as `directly-standardised') rates, standardised to the European Standard Population. These make allowances for differences in the age structure of the population, over time and between sexes. The age-standardised rate for a particular cause of death is that which would have occurred if the observed age-specific rates for that cause had applied in the given standard population. A template (93.5 Kb Excel sheet) showing how age-standardised rates are calculated is available on ONS website. The age-standardised mortality rates in this bulletin were calculated using the 2013 European Standard Population. The ESP used in the previous publications of C. difficile statistics was first introduced in 1976 but it has since been recognised that it is no longer representative of the age-structure of the population of European Union Member States. In light of this, Eurostat implemented a new version of the ESP in 2013. Historical data from 1999 onwards have also been recalculated using the 2013 ESP.

6. **Populations**

   Rates are calculated using mid-year population estimates. The mortality rates for 1999 to 2013 presented in this bulletin have been revised using the new 2013 European Standard Population, and will therefore differ from rates previously published.

7. **Rates based on small numbers**

   Age-specific rates were not calculated where there were fewer than three deaths in a cell. Similarly, age-standardised rates were not calculated where there were fewer than 10 deaths in a year. These rates are denoted by '••'. It is ONS practice not to calculate these, as rates based on such low numbers are susceptible to inaccurate interpretation. Age-standardised rates which were calculated from 10-19 deaths are italicised in order to warn users that their reliability as a measure may be affected by the small number of events.

8. **Confidence intervals**

   In this bulletin, a difference which is described as 'statistically significant' has been assessed using 95% confidence intervals. Confidence intervals are a measure of the statistical precision of an estimate and show the range of uncertainty around it. Calculations based on small numbers of events are often subject to random fluctuations. As a general rule, if the confidence interval around a figure overlaps with the interval around another, there is no significant difference between the two estimates.

9. **Special extracts of data**

   Special extracts and tabulations of deaths involving C. difficile data for Wales are available to order for a charge (subject to legal frameworks, disclosure control, resources and agreement of costs, where appropriate).

   The ONS charging policy is available on the ONS website

10. **Plan for mortality outputs**

    Future changes to mortality outputs are outlined in the plan for mortality outputs available on the ONS website.

11. **Feedback**

    We welcome feedback on the content, format and relevance of this release. Please send feedback to the postal or email address above.

12. **Pre-release access**

    A list of the names of those given pre-publication access to the statistics and written commentary is available in Pre-release access list to Deaths involving Clostridium difficile. The rules and principles which govern pre-release access are featured within the Pre-release Access to Official Statistics Order 2008.

13. **Revisions**

    The ONS revisions policy is available on our website.

14. **National statistics**

    National Statistics are produced to high professional standards set out in the Code of Practice for Official Statistics. They undergo regular quality assurance reviews to ensure that they meet customer needs. They are produced free from any political interference.

15. **Terms and conditions**

    You may use or re-use this information (not including logos) free of charge in any format or medium, under the terms of the Open Government Licence. To view this licence, visit the National Archives website, write to: The Information Policy Team, The National Archives, Kew, London TW9 4DU, or email: psi@nationalarchives.gsi.gov.uk.

16. Details of the policy governing the release of new data are available by visiting www.statisticsauthority.gov.uk/assessment/code-of-practice/index.html or from the Media Relations Office email: media.relations@ons.gsi.gov.uk