ONS Mortality Data
RSS meeting on challenges with analysing causes of deaths data

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Office for National Statistics
Coming up

Death certification
• History of death certification
• The current death certification process

Cause coding
• The underlying cause of death
• Historic changes

Changes – impact on mortality statistics
• IRIS for cause of death coding
• Death certification reform
Death certification

1 - A brief history

2 - The current death certification process
Death registration – where did it all begin?

• Parochial registration from the 16th century – “that there should be yearly delivered a summary of the whole whereby it should appear how many christenings, weddings and burials were every year within England and Wales.” Lord Burghley

• General Register Office – Founded 1836

  Births and Deaths Registration Act 1836:
  “That it shall be lawful for His Majesty to provide a proper Office in London or Westminster, to be called "The General Register Office," for keeping a Register of all Births, Deaths and Marriages of His Majesty's Subjects in England.”

• Civil registration begins 1 July 1837
Legislation – UK Statistics Authority

• **Registration Service Act 1953:**
  requires the UK Statistics Authority to produce annual abstracts of the number of live births, stillbirths and deaths

• **Statistics and Registration Service Act 2007:**
  Transfers some of the statistical functions of the Registrar General, including the production of an annual abstract, to the UK Statistics Authority and the Office for National Statistics (ONS) becomes the executive office of the UK Statistics Authority.

  The 2007 Act also provides the Registrar General with a power to allow them to disclose any information about a birth, death or a stillbirth to the UK Statistics Authority for statistical purposes.

  It also enables the UK Statistics Authority to produce and publish statistics relating to any matter. The act also includes a provision for the UK Statistics Authority to supply individual birth and death records to the NHS.
The Table of CASUALTIES.

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</tbody>
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Place this Table at page 114.
<table>
<thead>
<tr>
<th>Year</th>
<th>Event Description</th>
<th>Number of Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>1647</td>
<td>12 people died from grief</td>
<td>12</td>
</tr>
<tr>
<td>1632</td>
<td>40 people died from thrush</td>
<td>40</td>
</tr>
<tr>
<td>1629-32</td>
<td>221 people died suddenly</td>
<td>221</td>
</tr>
<tr>
<td>1629</td>
<td>19 people were executed</td>
<td>19</td>
</tr>
</tbody>
</table>
Death certification – cause of death

• 1874 - Doctor, medical certificate of cause of death (MCCD)

• Coroner
  Formally established in 1194

  An independent judicial officer charged with the investigation of sudden, violent or unnatural death.
Certification and registration of deaths in England and Wales

Originally certified by doctor on MCCD

Referred to coroner?

No

Coroner not consulted

Certified by doctor

Registrar → ONS
Certification and registration of deaths in England and Wales

- Originally certified by doctor on MCCD
- Referred to coroner?
- No → Coroner not consulted
- Certified by doctor → Registrar → ONS

80% of deaths via the ‘simple route’
Certification and registration of deaths in England and Wales

Deaths

- Originally certified by doctor on MCCD
  - Referred to coroner?
    - Yes: Coroner orders post-mortem and/or inquest?
      - Yes: Inquest with or without post-mortem
      - No: Post-mortem only
    - No: Coroner not consulted
  - Certified by doctor
- No MCCD – sent direct to coroner
  - Coroner orders post-mortem and/or inquest?
    - Yes: Inquest with or without post-mortem
    - No: Post-mortem only
- Certified by coroner

Registrar

ONS
Deaths

Originally certified by doctor on MCCD

Referred to coroner?

Yes → Coroner orders post-mortem and/or inquest?

Yes → Inquest with or without post-mortem

No → Post-mortem only

Certified by coroner

No → Coroner not consulted

Certified by doctor

Registrar

No MCCD – sent direct to coroner

20% of deaths via coroner route

Certification and registration of deaths in England and Wales

ONS
Data reaches ONS

• **Cause coding**
  Automated cause coding – over 80 per cent
  Inquest deaths manually coded
  Underlying cause selected

• **Miscellaneous coding**
  Sex, age, marital status
  Postcode – geography codes
  Occupation – socioeconomic status
  Place of death – eg: communal establishment
Mortality data - strengths

• Complete (?)

• Long time series:
  1838 – Registrar General’s Annual Reviews
  1901 – Twentieth Century Mortality
  1959 – Electronic mortality files
  1993 – Live database

• Rich data source
Mortality data – limitations (1)

- Long time series but ICD revisions and coding changes.
- Access – disclosure and confidentiality.
- Some data are not collected – e.g.: ethnicity, nationality.
- Population denominators often needed.
- Not all variables available on the death record are of the same quality: need to be careful.
Registration Delays – limitations (2)

- All deaths should be registered within 5 days of occurrence
- Deaths considered unexpected, accidental or suspicious will be referred to a coroner
Registration delay ICD chapter, England and Wales, deaths registered in 2011
Hello,

I would be grateful if you could possibly send me some figures regarding human mortality rates and injuries caused by cows on Public Rights of Way going back to 1993. As much information on type of injury, cause of death (eg trampling, heart attack) and possibly breed of cow would be appreciated.

I have searched your website for this information but did not come across anything.

Please let me know if there will be a charge for this information.

Kind regards,
And here is the answer...

Table 1: Number of deaths with an underlying cause of being bitten or struck by other mammals, 2013.

England and Wales

<table>
<thead>
<tr>
<th>Mammal</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cat</td>
<td>1</td>
</tr>
<tr>
<td>Cow/Bull</td>
<td>6</td>
</tr>
<tr>
<td>Horse</td>
<td>4</td>
</tr>
<tr>
<td>Stag</td>
<td>1</td>
</tr>
</tbody>
</table>
Cause coding

1 – The underlying cause of death
   • How underlying cause of death is derived

2 – Historical changes
   • Historic changes to ICD rules and the impact on mortality statistics
<table>
<thead>
<tr>
<th>When and where died</th>
<th>Name and surname</th>
<th>Sex</th>
<th>Age</th>
<th>Occupation</th>
<th>Cause of death</th>
<th>Signature, description and residence of informant</th>
<th>When registered</th>
<th>Signature of registrar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nineteenth April 1881 14 Burgoyne Street.</td>
<td>Benjamin Disraeli</td>
<td>Male</td>
<td>76 years</td>
<td>First Earl of Beaconsfield</td>
<td>Asthma, certified by Joseph Kidd M.D.</td>
<td>Frederick Baun present at the death of his father at 14 Burgoyne Street May Fair</td>
<td>Twenty first April 1881</td>
<td>J. L. Hughes Regist</td>
</tr>
</tbody>
</table>

Marginal note, if any.
MEDICAL CERTIFICATE OF CAUSE OF DEATH

For use only by a Registered Medical Practitioner WHO HAS BEEN IN ATTENDANCE during the deceased's last illness, and to be delivered by him forthwith to the Registrar of Births and Deaths.

Name of deceased..................................................

Date of death as stated to me ............................................. day of ............................................. Age as stated to me .............................................

Place of death .........................................................

Last seen alive by me ..................................................... day of .............................................

1. The certified cause of death takes account of information obtained from post-mortem.
2. Information from post-mortem may be available later.
3. Post-mortem not being held.
4. I have reported this death to the Coroner for further action.
   (See overleaf)

CAUSE OF DEATH

The condition thought to be the 'Underlying Cause of Death' should appear in the last completed line of Part I.

I (a) Disease or condition directly leading to death†

(b) Other disease or condition, if any, leading to: I(a)

(c) leading to: I(b)

Other disease or condition, if any,

II Other significant conditions
CONTRIBUTING TO THE DEATH but not related to the disease or condition causing it

The death might have been due to or contributed to by the employment followed at some time by the deceased

† This does not mean the mode of dying, such as heart failure, asphyxia, asthenia, etc: it means the disease, injury, or complication which caused death.

I hereby certify that I was in medical attendance during the above named deceased's last illness, and that the particulars and cause of death above written are true to the best of my knowledge and belief.

Signature.......................................................... Qualifications as registered by General Medical Council ..........................................................

Residence.......................................................... Date..........................................................

For deaths in hospital: Please give the name of the consultant responsible for the above-named as a patient..........................................................
**Medical Certificate of Cause of Death**

<table>
<thead>
<tr>
<th>CAUSE OF DEATH</th>
<th>Approximate interval between onset and death</th>
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<tbody>
<tr>
<td><em>The condition thought to be the ‘Underlying Cause of Death’ should appear in the lowest completed line of Part I</em></td>
<td></td>
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<tr>
<td>I(a)Disease or condition directly leading to death.</td>
<td>........................................................</td>
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<tr>
<td>(b) Other disease or conditions, if any, leading to I(a)</td>
<td>........................................................</td>
</tr>
<tr>
<td>(c) Other disease or conditions, if any, leading to I(b)</td>
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</table>

| II Other significant conditions CONTRIBUTING TO THE DEATH but not related to the disease or condition causing it | ........................................................ |
|                                                                                                               | ........................................................ |
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|                                                                                                               | ........................................................ |
Mortality statistics

• Reported using the underlying cause of death

• Defined by World Health Organisation as
  a) The disease or injury which initiated the chain of morbid events leading directly to the death
  b) The circumstances of the accident or violence which produced the fatal injury
Coding cause of death

• Condition recorded on the lowest used line of Part I of the certificate is usually the underlying cause of death

• However in the ICD there are selection and modification rules to ensure that UCD is derived from a valid sequence

• Automatic cause coding software incorporates these rules
General Principle

When more than one condition is entered on the death certificate, the condition entered on the lowest used line of Part I should be selected, but only if it could have given rise to all the conditions entered above it.

If this is not the case then the following **selection rules** are applied:

**Rule 1.** If there is a reported sequence terminating in the condition entered first on the death certificate, select the originating cause of this sequence.

**Rule 2.** If there is no reported sequence terminating in the condition first entered on the death certificate, select the first-mentioned condition

**Rule 3.** If the condition selected by the General Principle, Rule 1 or Rule 2 is obviously a direct consequence of another reported condition (whether in Part I or Part II of the death certificate), select this primary condition
Examples – General Principle

I  a Hepatic Failure
   b Bile duct obstruction
   c Carcinoma of head of pancreas

II

UCD = Carcinoma of head of pancreas (C25.0)
Examples – Rule 1

I
a Oesophageal varices and congestive heart failure
b Chronic rheumatic heart disease and cirrhosis of the liver
c

II

UCD = cirrhosis of the liver (K74.6)
Examples – Rule 2

I  a Pernicious anaemia and gangrene of foot
   b Atherosclerosis
   c

II

UCD = Pernicious anaemia (D51.0)
Examples – Rule 3

I  a  Tuberculosis
   b
   c
II  HIV disease

UCD = HIV disease resulting in mycobacterial infection (B20.0)
Changes which impact mortality statistics

1 - Coding changes
  • IRIS for cause of death coding

2 – Mitigating the impact of coding changes
  • Comparability ratios

3 - Death certification reform
Coding changes

Why?
Coding changes are made in response to emerging evidence, often representing changes in schools of thought.

(1) Additions or deletions of cause codes
(2) Amendments to rules used to select the underlying cause of death.

Coding changes represent the best international practice.
Implementation of IRIS
What is IRIS?

• Software used to code cause of death to a package called IRIS (version 2013).

• The development of IRIS was supported by Eurostat (the statistical office of the European Union) and managed by the IRIS Institute hosted by the German Institute of Medical Documentation and Information in Cologne.

• Provide a common mortality coding system that can be used for coding death certificates, written in any language, according to ICD mortality coding rules and instructions.

• The use of the IRIS software will help to improve the international comparability of mortality statistics.

• Currently IRIS uses components of the NCHS Mortality Medical Data System (MMDS) to code the causes of death.
The impact of IRIS

- Dual coded 2012 registrations, (excluding neonates)
- Records were selected from each quarter to avoid seasonal influences
- Weeks around public holidays were excluded
- 38,718 records (7.8 per cent) selected for dual coding
Chest Infections

v2010: J98  ➔  IRIS: J22

- Respiratory disease: 2.5%
- Mental and behaviour disorders: 7.0%
What can I do about this?

- Comparability ratios

Bring data from previous coding systems inline with updated practice.

ONS makes users aware of important coding changes were applicable; up to user to apply comparability ratios.
The moral of the story

• Any change to the process means a change to the statistics...

• And while we are talking about process change – let’s move onto death certification reform...
Death Certification Reform

• Harold Shipman (GP) certified the deaths of 250 victims without challenge

• Inquiry into Shipman's crimes in 2004 recommend:
  • All deaths that do not require investigation by a coroner will undergo the independent scrutiny of a locally appointed Medical Examiner
  • Independent and proportionate scrutiny of relevant health records, examining the deceased person’s body (in most cases) and in all cases discussing the death with a relative or other appropriate person.
Death Certification reform pilots

• The new process was piloted by the in six areas across England and Wales, commencing in 2008.
• Office for National Statistics (ONS) carried out a case study investigating records from five of the six pilot areas.
• The cause(s) of death proposed initially by the certifying medical practitioner and also the confirmed cause(s) of death following medical examiner scrutiny of the deceased’s medical history and hospital notes.
Impact

• More likely to add supplementary information to the death certificate.

• This often led to more conditions being mentioned and to the order in which they were presented on the cause of death certificate being altered.

• As a result there was a change to the underlying cause of death in 22 per cent of cases.
Impact by cause

• 1 % more death certificates with an underlying cause of cancer
• 6 % increase the proportion of deaths that were attributed to diseases of the circulatory system
• 7% decrease in deaths attributed to a respiratory disease

• In general, more conditions were mentioned on the death certificate as a result of scrutiny by medical examiners
Thanks!

Any questions?

Contact:
mortality@ons.gsi.gov.uk