Death Certification. Defining the Error Rate and Considering the Effect on Mortality Statistics
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Vermont Office of the Chief Medical Examiner
• Medical Examiner Office within Vermont Department of Health
• Statewide Jurisdiction
• Central Office Staffing and Investigative Field Staffing
• Population of 600,412
• Investigate approximately 1,700 cases/year
• Review every death certificate
  • Completeness
  • Accuracy
  • Red Flags

• Request for Task Order Proposal through CDC/NCHS/DVS for a pilot evaluation of the Quality of the Cause of Death on Mortality Records in August 2015.
• Contract awarded and supported through the Vital Statistics Cooperative Program contract between the Centers for Disease Control and Prevention and the Vermont Department of Health
• Study period September 2015 through August 2016 with an extension through November 2016
Objective

- Primary objective was to characterize inaccuracies in cause and manner of death data among non-medical examiners
- ICD-10 coding was compared to analyze the effect on 113 Selected Causes of Death and Rankable Causes of Death lists to determine impact on national statistics

Methods

Randomly Selected Vermont Death Certificates

Excluded

N=750

Met Inclusion Criteria

N=601

Vermont Electronic Death Registration System

Assigned to five Medicolegal Death Investigators

Forensic Pathologists

Cause/Manner of Death

Consensus

Methods continued

Original Death Certificate

Mock (Consensus) Death Certificate

Obtained ICD-10 coding

N=580

Sent to NCHS for ICD-10 coding

Error analysis performed using grading system for major and minor errors

Change in order of codes, number of codes and specific codes

Change in UCOD code effect on 113 Selected Causes of Death list and Rankable Causes of Death list
Scale for Grading Errors on Death Certificates

Class I. Minor Error (limited impact on interpretation)
   a. Inappropriate information included
   b. Abbreviations

Class II. Minor Error (potential impact on interpretation)
   a. Errors of sequencing regardless of whether or not an underlying cause is provided
   b. Multiple underlying causes in Part I
   c. Major comorbidities contributing cause(s) absent or wrong

Class III. Major Error (impact on interpretation of contributing causes)
   a. Major comorbidities/contributing cause(s) absent or wrong

Class IV. Major Error (impact on interpretation of cause and manner)
   a. Underlying cause listed as contributory cause(s) in Part II
   b. No underlying cause in Part I
   c. Wrong underlying cause or underlying cause not on last line of Part I
   d. Wrong manner of death

Results – Error Analysis

ICD-10 Coding Comparison

- Coding for original certificates was compared to coding for mock certificates in 580 of 601 cases
- Change in order of codes, number of codes and specific codes were analyzed
- Change in underlying cause code (UCOD) effect on 113 Selected Causes of Death list and Rankable Causes of Death list
Code Comparison

- 113 Selected Causes of Death – used for the general analysis of mortality and for ranking leading causes of death
- Rankable Causes of Death List – used by the National Center of Health Statistics for tabulation and dissemination of mortality statistics

Results – Coding Comparison

Change in Underlying Cause of Death Code (UCOD) Between Original and Mock Death Certificate

<table>
<thead>
<tr>
<th>Type of Change in Underlying Cause of Death Code</th>
<th>N with change</th>
<th>Total N</th>
<th>% with change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any Underlying Cause of Death Code Change</td>
<td>348</td>
<td>580</td>
<td>60%</td>
</tr>
<tr>
<td>Underlying Cause of Death Code Change that Affects 113 Cause</td>
<td>289</td>
<td>348</td>
<td>83%</td>
</tr>
<tr>
<td>Underlying Cause of Death Code Change that Affects Rankable Cause</td>
<td>169</td>
<td>348</td>
<td>49%</td>
</tr>
</tbody>
</table>

Results – Coding Comparison

Effect of Death Certificate Error Class on Cause Classification Lists

<table>
<thead>
<tr>
<th>Total with Error</th>
<th>113 cause change</th>
<th>Rankable cause change</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Change</td>
<td>No change</td>
</tr>
<tr>
<td>Correct UCOD not in Part I</td>
<td>141</td>
<td>115</td>
</tr>
<tr>
<td>Correct UCOD not on DC</td>
<td>51</td>
<td>76</td>
</tr>
<tr>
<td>Correct UCOD not on last line</td>
<td>176</td>
<td>128</td>
</tr>
</tbody>
</table>
Limitations

• Results may not generalize to other counties/states or ME/C systems
• Cause and manner of death determination was limited to the quality of medical records
• Differences in medical opinion
  • Mock certification by consensus in this study limited this type of error (Medical Examiners were discordant for underlying cause of death in 12% of cases)

Strengths

• All reviewers in the study have clinical/medical backgrounds with ability to understand and summarize medical records to determine cause/manner of death
• The use of medical records (vs coded data or problem lists) and physician reviewers with specific expertise in death certification are unique aspects of this study providing optimal retrospective evaluation
• Study is reproducible with a clearly defined scale for grading errors

Closing Remarks

• Error rates in death certification are high, extending to ICD-10 coding which may impact national mortality statistics
• Accurate certification is the foundation for good epidemiologic data, but certification error rate is not directly proportional to the error of mortality statistics. ICD-10 coding may increase or mitigate errors
• Despite active interventions to improve quality of death certification, Vermont’s error rate is high. Jurisdictions with less active efforts may be even higher
• Certifiers goal is to accurately explain why the person died not how that literal text will fit into ICD-10 coding
Next Steps?

• Research needs:
  • Limited research on death certification errors outside an academic setting or hospital
  • Similar studies in other regions of the country are needed
  • Evaluate contributions of death certification and coding on national mortality statistics

• Possible solutions:
  • Implementation of hospital comprehensive reviews of death certificates with internal feedback to certifiers
  • Standardizing or simplifying underlying cause of death literal text on death certificate

Thank you
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