

Louisiana Death Certificate Accuracy: A Concern for the Public's Health

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Introduction: The accuracy of death certificates is essential for public health prevention and research in the State of Louisiana. This article analyzes the accuracy of cause of death stated on Louisiana death certificates.

Methods: Discharge diagnoses from 2007 Louisiana Hospital Inpatient Discharge Diagnosis (LAHIDD) data were compared with the diagnoses in the cause of death section in the corresponding death certificates.

Results: Of the immediate causes of death, only 40.5% were considered an exact match and 17.4% did not have any type of match in the LAHIDD discharge diagnoses. For the preceding causes of death 54.0% of death certificates had no exact matches. There were only 55 (8.8%) of death certificates with no possible missing diagnosis.

Conclusion: There are significant inconsistencies between the discharge diagnosis upon death and cause of death. This raises concern for public health and education is needed for physicians to improve accuracy of death certificates.

INTRODUCTION

Death certificate data play an important role in both clinical and public health medicine. The accuracy and consistency with which such mortality data are reported are essential for directing research and healthcare resources. This article attempts to assess the accuracy of Louisiana State death certificates as it relates to accurately reflecting the true cause of death and underlying conditions contributing to the demise of the patient.

BACKGROUND

A short review of proper reporting of cause of death on a death certificate is necessary for complete understanding of the data to be presented. This article refers to item 30 of the State of Louisiana Death Certificate under the label *Cause of Death*.

Item 30 has two sections Part I and Part II. Part I states: "Enter the Diseases, Injuries or Complications that cause the Death. Do not enter the mode of dying such as cardiac or respiratory arrest or heart failure. List only one cause on each line." Line 'a' should state the immediate cause of death.

Line 'b' should state the condition that lead to line 'a'. And so forth, up to line 'd' as necessary. Part II states: "Other significant conditions contributing to death but not resulting in the underlying cause in part I." A check box for *Tobacco and Other* with space for stating contributing diagnoses are provided under Part II.¹

The objective is to create a succinct description of the events that lead to the death of the individual. Though clinical judgment is necessary as to what should be included in the death certificate, the major contributors to the patient's poor health leading to death should be clear to a medically trained person not familiar with the patient. See the following appropriate cause of death examples for death certificate completion.^{2,3}

Example 1²

Part I:

- A. Cardiac Tamponade
- B. Myocardial infarction with left ventricular rupture
- C. Atherosclerotic coronary artery disease

Part II: Alzheimer Disease, Diabetes Mellitus Type II.

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THE RESPONSE

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Example 2²

Part I:

- A. Hepatic encephalopathy
- B. Cirrhosis of the liver
- C. Chronic Alcohol Abuse

Part II: Smoking, Poly-substance Abuse, Bipolar Disorder

METHODS

Data was obtained from Louisiana 2007 death certificates and Louisiana Hospital Inpatient Discharge Data (LAHIDD). All patients with: 1) a valid social security number, 2) having a hospital stay of at least 5 or more days, 3) no autopsy done, and 4) coded as having died in the hospital were taken from the LAHIDD data and matched with 2007 Louisiana death certificate by social security number and birth date. Patients with an autopsy performed were excluded because it was thought that additional information about the death may come to light through the autopsy that was not available upon discharge. Patients who did not die in the hospital and therefore would not have a corresponding LAHIDD record for the death were also excluded. Finally, patients who were in the hospital for less than five days were not included. This was due to the authors' assumption that a patient in the hospital for an extended period of time may be more apt to have complete medical records in comparison, for example, to a person who presented in the last hours of his life or otherwise unable to give a medical history. There were 2256 records found to meet the criteria. The records were merged then placed in order by a random number system. A random sample of 622 (27.6%) records were reviewed.

Three primary areas of correlation evaluated on the death certificate were 1) the immediate cause of death (Part I a of Cause of Death Section), 2) the conditions leading up to the immediate cause of death (Part I b-d of Cause of Death Section referred to as preceding causes of death), and 3) other significant underlying conditions contributing but not resulting in the death of the patient (Part II of Cause of Death Section).

The immediate cause of death and preceding causes of death were then compared to the diagnoses available on the corresponding discharge diagnoses of the LAHIDD. Once a discharge diagnosis had been used it could not be reused again to validate other diagnoses in the death certificate.

Exact Match

If there was an exact match in LAHIDD for the immediate cause of death, than the immediate cause of death was labeled as *Exact Match*. An example of an exact match would be if the death certificate stated "*Multiple Myeloma*" and a LAHIDD discharge diagnosis stated "*Multiple Myeloma with mention of remission*." (Death certificate data used International Classification of Diseases (ICD)-10 codes while LAHIDD data still uses ICD-9 codes therefore order of wording was ignored as long as integrity of the match was maintained).

System Match

If there was a diagnosis in the list of discharge diagnoses in the LAHIDD that referred to the same anatomic system then the death certificate immediate cause of death was labeled as a *System Match*. For example, the death certificate state "*Stomach, unspecified*" and the LAHIDD discharge diagnosis that most closely matched was "*Malignant Neoplasm of Stomach, Unspecified*."

Disease Match

If there was a code in LAHIDD discharge diagnosis that referred to the same disease process (such as cancer or infection) then the immediate cause of death was labeled as *Disease Match*. For example, the death certificate states "*Rheumatoid arthritis, unspecified*" and the LAHIDD discharge code that match most closely was "*Rheumatoid Lung*." If no code could be found in LAHIDD discharge diagnosis to correspond to the death certificate's immediate cause of death then the immediate cause of death was referred to as *No match* or *None*. The same was done for the preceding causes of death but the number of *Exact Matches*, *System Matches*, *Disease Matches*, and *No Matches* were recorded as well. No discharge diagnosis in LAHIDD could be used more than once to validate a death certificate cause of death.

All data was compiled in Microsoft Office Access 2007® and statistic were analyzed in Epi Info 3.5.1™. Data categorization was reviewed by a second researcher with good consistency found and quality categorization confirmed.

RESULTS

The mean age of the population was 74.3 years with a minimum age of two years, a maximum of 102 years and a median of 78.5 years. There were 56.3% (n=350, 95%CI= 52.3%, 60.2%) females and 43.7% (n=43.7%, 95%CI 39.8%, 47.7%) males. Thus, there were significantly more females than males in the study population.

Of all 2256 records that met the criteria to be analyzed, only 124 (5.50%) had any information in Part II. It was therefore decided that the statistical instability of such a small number of death certificates having a complete Part

Table 1. Immediate causes of death in 2007 Louisiana death certificates with a corresponding match in Louisiana Hospital Inpatient Discharge Diagnosis (LaHIDD) discharge data.

	#	%
Exact Match	251	40.5
System Match	221	35.6
Disease Match	40	6.5
No Match	108	17.4

Table 2. Preceding causes of death in 2007 Louisiana death certificates with a corresponding match in Louisiana Hospital Inpatient Discharge Diagnosis (LaHIDD) discharge data.

	No Match	≥1 Exact Matches ± Other Matches	No Exact Match ≥1 Other Match*
%	40.80%	45.70%	13.20%
#	254	284	82

*Other Match includes system match and disease match

II of the cause of death would be too great and was not reviewed further.

The results for the number of diagnoses for the immediate cause of death and preceding causes of death with a corresponding discharge diagnosis in LAHIDD can be seen in Table 1. Of the immediate causes of death, only 40.5% were considered an exact match and 17.4% did not have any type of match in the LAHIDD discharge diagnosis. For the preceding causes of death 54.0% of death certificates had no exact matches (Table 2).

The number of discharge diagnosis in LAHIDD that could have been possibly included in the death certificate cause of death section parts I and II was also calculated. Again due to the small number of completed Part II section of the cause of death, it was assumed that there were no entries in that section. There were only 55 (8.8%) death certificates with no missing diagnosis. There were 64 (10.3%) death certificates missing one diagnosis, 149 (24.0%) missing two, 170 (27.3%) missing three, 113 (18.2%) missing four, 56 (9.0%) missing five, 13 (2.1%) missing six, and two (0.3%) missing seven diagnoses.

Analysis by hospital or by a sample of systems did not show any differences in the results. It appears that the inconsistencies are widespread.

LIMITATIONS

The gold standard for death certificate accuracy would be to evaluate a complete medical history review with access to all the medical records of the patient. The *Mid America Heart Institute Death Certificate Scoring System* is probably the best well known system based on medical records to rate death certificate accuracy. However with the available data for this paper, there was no known standardized system of categorizing accuracy and it was not feasible to obtain full medical records.

Another limitation is the basic tenet behind diagnosis coding for discharge and for death certificates. While theoretically there should be little difference, reimbursement greatly affects final discharge coding and may not be entirely representative of the true nature of the patient's condition.

CONCLUSION

There are significant inconsistencies between the diagnosis given to a patient upon discharge after death in a hospital and the same patient's cause of death. This raises concern for public health and targeting prevention work targeted toward major causes of mortality in the state of Louisiana.

While there are other data that may directly provide collaborative evidence on the true causes of death, death certificates remain a major source of public documentation of disease and mortality in the United States. Accuracy is essential for the most complete and precise picture of mortality in the State of Louisiana.

Education has been shown to improve residents' ability to appropriately complete the cause of death section of death certificates.^{4,5} The authors of this article propose that in the state of Louisiana education on appropriate death certificate completion be included in curriculum for all physicians in training. It would also be useful to institute a quality control system for evaluating the accuracy of death certification. This quality control could be targeted at a sample of death certificates following the same methods used in this article and the results could be reported regularly to those in charge of coding and those in charge of filling out death certificates.

REFERENCES

1. Louisiana Office of Public Health, State Center for Health Statistics. 2003 Louisiana Vital Statistics Report, page 179. < http://www.dhh.louisiana.gov/offices/miscdocs/docs-275/recordsstatistics/statistics/vitalstatistics/docs/annualreports/Vital%20Statistics%20Report%202003_Whole%20Book.pdf> (accessed 20 September, 2010).
2. National Association of Medical Examiners. Writing Cause of Death Statements – Basic Principles, Sept. 3, 2005. < http://thename.org/index.php?option=com_content&task=view&id=113&Itemid=36> (accessed 20 September, 2010).
3. Centers for Disease Control and Prevention's National Center for Health Statistics. *Physicians' Handbook on Medical Certification of Death*, 2003 revision. Hyattsville, Md: US Department of Health and Human Services; [DHHS publication No. (PHS) 2003-1108].
4. Lakkireddy DR, Basarakodu KR, Vacek JL, et al. Improving death certificate completion: a trial of two training interventions. *J Gen Intern Med* 2007;22:544-548.
5. Villar J, Pérez-Méndez L. Evaluating an educational intervention to improve the accuracy of death certification among trainees from various specialties. *BMC Health Serv Res* 2007;7:183.

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