

Comparing Strategies for Veteran Mortality Ascertainment

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Abstract

Background

Veterans are an important, vulnerable population in which mortality has been examined as a function of race / ethnicity, access, and quality of care. We determined optimal strategies for mortality ascertainment comparing death certificates and Veterans Administration (VA) records.

Methods

We constructed a cohort of California veterans who died in fiscal year (FY) 2000 and used VA services the year before death. We determined decedent status using California death certificates as the gold standard linked to VA utilization data and the VA Beneficiary Identification and Records Locator System (BIRLS). We compared the demographic and clinical characteristics and utilization of decedents identified by death certificates with those identified by VA records.

Results

Although total of 8,813 veteran decedents were identified by death certificates, the decedent status of 2,426 / 8,813 (28%) of veterans was not identified in VA decedent files. Decedents whose mortality status was ascertained through death certificates alone differed by race / ethnicity, marital status, and California residence. Clinically, veterans identified with death certificates had less comorbidity. They were less likely to have been users of VA nursing home or inpatient care, but more likely to have been users of VA outpatient services.

Conclusion

VA death files provided an incomplete records of veteran mortality and ascertainment may be improved by use of death certificates, depending on the group of analytic interest.

Background

Clinicians, healthcare administrators, researchers, regulators and policymakers are concerned with optimizing mortality ascertainment using administrative data. In addition to its clinical importance, mortality informs program planning, quality assessment and improvement, and public reporting [1-5]. Veterans are an important, vulnerable population in which mortality has been examined as a function of race / ethnicity, access, and quality of care. Valid reporting is critical to the success of such endeavors, and VA administrative data is generally regarded as an excellent source of mortality information [6-13]. Using death certificates as a 'gold standard, we determined the false-negative rate of death ascertainment within VA mortality records and examined the relationship between ascertainment with the demographic and clinical characteristics of veterans and settings in which they received care.

Methods

In order to evaluate the implications for improving veterans end-of-life care, we constructed a population-based decedent cohort [14]. For such purposes, it is particularly important to understand whether death was recorded elsewhere for veterans who were under VA care since the VA system may be responsible for much of their end of life care even if they do not die while receiving health care in a VA facility.

Data Sources

The VA Beneficiary Identification and Records Locator System (BIRLS) is a database that contains records of all beneficiaries including veterans whose survivors applied for burial benefits. It includes records on discharged military veterans post-1973 and recipients of Medals of Honor and VA education benefits. After submission to the Veterans Benefits Administration [15-17], deaths are recorded in the BIRLS

Death File. The VA maintains a National Patient Care Database (NPCD) that contains a record of Social Security Number (SSN) linked VA and contracted health services provided to all veterans [14,15]. Death certificates are required for burial in California and are available for public use [18].

We first identified 345,380 decedent veterans who died during FY2000 (30 September 1999 – 1 October 2000) from the BIRLS Death File. We used SSNs to link cases to VA NPCD outpatient, inpatient, or long-term care records restricted to recipients of any VA services in California within 12 months of death. We extracted records including any inpatient or long-term care admission, or outpatient encounters. Veterans who entered the cohort on the basis of using outpatient services were required to have at least one clinical encounter (e.g., other than laboratory, radiology, or administrative).

Next, we used death certificates as a gold standard source file to identify additional decedent veterans by linking SSNs from death certificates directly to VA utilization files. California death certificates contained 462,561 records for calendar years 1999 and 2000, and we matched decedents identified through death certificates to BIRLS by SSN. We manually inspected matches on SSN only and matches on criteria other than SSN (e.g. last name, first name, date of birth, date of death). Additional cases we accepted after manual inspection involved transpositions of one and rarely more than one SSN digit but agreement in other fields.

We excluded cases of non-veterans receiving care at VA facilities by examining indicators of veteran status associated with visits. The VA assigns specific codes to

non-veterans rendered care for various reasons (e.g., emergency, charitable). We also considered the possibility of erroneous decedent status by looking for evidence of healthcare utilization during the 12 months after death. We excluded cases with evidence of utilization more than one month after the date of death.

Variables and Analysis

We used VA encounters and ICD-9-CM codes to demographically (e.g age, gender, marital status, state of residence, and race / ethnicity) and clinically characterize decedents [19-24]. We identified veterans with any visit or admission for congestive heart failure (CHF), ICD-9-CM 398.91, 402.x1, 404.x1, 404.x3 428.x excluding procedures, chronic obstructive lung disease (COPD), ICD-9-CM 491-492.x, 494.x, 496, end stage liver disease (ESLD), ICD-9-CM 571.2-571.9,572.2-572.8, dementia, ICD-9-CM 046.1, 290.0-290.43, 331.0-331.7, 333.4, 438.0, and cancer, ICD-9-CM 140.0-208.9 [23]. To identify end stage renal disease (ESRD), we used procedure and clinical stop codes that identify the type of care received (e.g., dialysis) [24]. We developed a complexity index of co-morbidity based on a simple count of advanced illnesses.

We compared the demographics, clinical characteristics, and utilization of cases identified by either BIRLS or death certificates and cases identified by death certificates alone using Wilcoxon tests for continuous and chi-square tests for categorical variables. We also describe the percent of decedent cases missing using VA data alone compared to using VA data and death certificates. To illustrate the contribution of the setting of care to the mortality ascertainment strategy, we determined the percent missing from the cohort of patients who had received any outpatient, any inpatient, and any long term care services during the year before death.

Results

California death certificates included 227,308 deaths concurrent with the VA fiscal calendar. From VA source files, we identified 6,071 decedents, and death certificates identified 3,580 additional cases not found in BIRLS. We excluded non-veteran recipients of VA care (n=365), non-clinical utilization (n=251), non-decedents (n=229), and 3 cases that did not appear to be true SSN matches. Of the final cohort of 8,813 veteran decedents, 6,387 (72%) cases identified through death certificates were also found in VA source files and 2,426 (28%) additional cases were only identified through death certificates (Figure 1).

Fewer decedents identified by death certificates alone were black (185; 8% vs. 754; 12%) or white (1310; 54% vs. 3620; 57%) and a greater proportion were of missing ethnicity (762; 31% vs. 1557; 24%). A lower proportion of veterans identified only through death certificates were single (323; 13% vs. 991; 16%) or missing (50; 2% vs. 228; 4%) and a higher proportion were married (1195; 49% vs. 2956; 46%), divorced (576; 24% vs. 1488; 23%), or widowed (282; 12% vs. 724; 11%). A lower proportion of veterans identified by death certificates alone reported a residence other than California (21; 1% vs. 486; 8%).

With the exception of HIV and dementia, decedents identified only in death certificates were less likely to have a diagnosis of advanced illness (CHF 466; 19% vs. 1374; 22%; COPD 583; 24% vs. 1786; 28%; ESLD 109; 4% vs 360; 6%; ESRD 32; 1% vs. 204; 3%). More decedents identified only through death certificates lacked any diagnosis of advanced illness compared to cases identified using BIRLS (903; 37% vs. 2213; 35%). Decedents identified only through death certificates were less likely to have been users of any healthcare setting, particularly long-term care (291;

12% vs. 1295; 20%) or inpatient care (713; 29% vs. 2874; 45%). The proportion of decedents that would be incorrectly ascertained without death certificates illustrates the potential analytic impact of these differences (Table 2).

Discussion

Mortality ascertainment was significantly improved by using death certificates in addition to VA source files. Cases identified in death certificates alone were less likely to be white or African-American and more likely to have a missing race / ethnicity, more likely to have been married, divorced, or widowed and less likely to have been single or have a missing marital status, less likely to be out-of-state residents, less likely to have high comorbidity, and less likely to have a recorded diagnosis of metastatic cancer, CHF, COPD, ESKD, ESRD or HIV, less likely to have used inpatient or long-term care services, and more likely to have used outpatient care.

Our findings are consistent with Washington state where the deaths of 26% of veterans seen only as outpatients were only identified with death certificates [9]. It's not surprising that deaths of generally healthier veterans primarily seen as outpatients are less likely to be noted in VA BIRLS. Death notification is triggered by benefit claims and affluent veterans would probably be less likely to file benefit claims were drawn to the VA recently by the availability of pharmaceutical coverage. Workload expanded from 3.1 million to 4.7 million patients from 1997-2001 and upper income enrollment (e.g. Category 8) was rescinded in January 2003 [25].

One limitation of our study is that we did not identify cases that were only decedents by virtue of VA utilization files alone rather than BIRLS, although Dominitz, et. al., identified only 2.7% of deaths this way [9]. We did not compare VA files to the NDI, as have previous studies of VA data that have used the NDI as a gold standard. We report findings for only one state, but given similar findings in Washington State, it would be helpful to determine if this is a national issue or there are particular state issues related to BIRLS death file agreement.

Conclusions

Researchers, managers, and policy makers should understand the limitations of sources of mortality ascertainment. The relationship of missing data to bias is related somewhat to how “missingness” is distributed by the outcome of interest. Our findings suggest these concerns may be relatively more important for studies involving veterans and racial-ethnic disparities, co-morbidity, certain disease comparisons, or settings of care. Additional study is needed to compare BIRLS, death certificates, and the NDI for mortality ascertainment in veterans. Studies of end of life care using decedent cohorts need to pay particular attention to this concern.

Competing interests

None declared.

Authors' contributions

KL originated and oversaw all aspects of the conception, design, analysis, and publication of the study. SA, LR, and EY contributed to conception, design, and analysis. MW contributed to analysis and is responsible for programming. All authors reviewed and approved of the manuscript.

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Figures

Figure 1 - Cohort Development

Tables

Table 1 - Comparison of Decedents Identified by BIRLS and Death Certificates Compared with Those Identified by Death Certificates Alone*

	BIRLS and Death Certificate (N=6,387)	Death Certificates Alone (N = 2,426)	P-value
Age (years)	70.86	71.15	0.8253
Gender			
Male	98	97	0.2733
Race / Ethnicity			
White	57	54	<0.001**
Black	12	8	

Hispanic	5	5	
Other	2	2	
Missing	24	31	
Marital Status			
Married	46	49	0.0002**
Single	16	13	
Divorced	23	24	
Widowed	11	12	
Missing	4	2	
State of Residence			
California	92	99	<0.001
Non-California	8	1	
Utilization-Based Diagnosis			
Metastatic cancer	35	32	0.0426
CHF	22	19	0.0175
COPD	28	24	0.0002
ESLD	6	4	0.0327
ESRD	3	1	<0.0001
Dementia	11	11	0.9656
HIV	1	1	0.1586
Complexity Index			
0	35	37	<0.0001
1	35	39	
2	22	18	
3	7	5	

4	1	1	
Site of Utilization			
Any inpatient	45	29	<0.0001
Any long-term-care	20	12	<0.0001
Any outpatient	95	96	0.0225

*findings are expressed as proportions unless otherwise identified. P-values reflect Wilcoxon two-sided probabilities for continuous variables and chi-square for categorical variables.

**test for differences including missing

Table 2 - Proportion Missing Using VA Data Alone for Death Ascertainment

	Missing*
Age	
< 65 years	26
≥ 65 years	28
Gender	
Male	27
Female	29
Race / Ethnicity	
White	27
Black	20
Hispanic	27
Other	28

Missing	33
Marital Status	
Married	29
Single	25
Divorced	28
Widowed	28
Missing	18
State of Residence	
California	28
Non-California	4
Utilization-Based Diagnosis	
Metastatic cancer	26
CHF	25
COPD	25
ESLD	23
ESRD	14
Dementia	27
HIV	21
Complexity Index	
0	29
1	30
2	24
3	22
≥4	18
Site of Utilization	

Any outpatient	28
Any inpatient	20
Any long term care	18

*Table illustrates the % of 8,813 decedents in each category that would be missing using VA BIRLS alone.

Figure 1. Cohort Development

