

Analysis of Death Sources

Data Analysis Subgroup Date of Death Workgroup

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Health Information Governance
Data Quality Program
Business Product Management*

April 1, 2015



Analyses Purposes

- Support the development of procedures and processes to update an individual's date of death.
- Two Analyses
 - Date of Death Sources
 - Evaluate date of death sources and their consistency and usefulness in ascertaining whether individuals are deceased.
 - Activity After Death
 - Evaluate activity after an individual's date of death and develop an algorithm to validate a date of death and assess the risk of accepting the date of death without further validation.

Population – Date of Death Sources Analysis

- Individuals in VistA that have no date of death in their records on March 5, 2015
- Excluded
 - Individuals without an Integrated Control Number Assigned (~141,000 records)
 - Individuals identified as possible test patients (~94,000 records)
 - Individuals not on the MVI demographics (age and gender) extract (6,282 individuals)
 - Deprecated on MVI but not in Local VistA
 - Individuals with a date of death in any of their records (4,712,507)
- Total individuals in the population without a date of death
 - 16,749,845

Date of Death Sources

- SSA Death Master File
- CMS (Medicare) Data (VHA Vital Status File)
- NCA Burial Operation Support System (MVI BOSS correlations)
- NCA Automated Monument Application System (MVI AMAS correlations)
- MVI Primary View
 - Should contain dates of death from BOSS and AMAS correlations
- Department of Defense (MVI DoD correlations)
 - MVI DoD correlations
- VAMC (MVI VAMC correlations)
- VBA BIRLS and Corporate
 - VBA Extract from HEC, March 2015
 - MVI BIRLS correlations
- Enrollment Systems

Date of Death Source Extract Matching Criteria

- Matching to Population Criteria
 - CMS Data
 - SSN, gender, and date of birth
 - 84% matched on SSN, DOB, and Gender out of those with an SSN match
 - SSA DMF
 - SSN and date of birth (Name available but not used)
 - 80% matched on SSN and DOB out of those with an SSN match
 - VBA
 - SSN, gender, and date of birth (Name available but not used)
 - 73% matched on SSN, DOB, and Gender out of those with an SSN match
 - All other sources
 - ICN

Summary of Death Sources

Table 6: Summary of Date of Death Sources

File	Records	ICNs	Incomplete Date of Death	In Analysis Population	Most Recent Date of Death
CMS (VHA VSF)				1,244,431	January 23, 2014
SSA DMF				2,510,220	March 6, 2015
MVI Primary View	3,394,766	3,114,668	36,828	470,160	July 11, 2014
MVI BOSS	1,277,497	1,158,936	0	194,117	April 1, 2014
MVI AMAS	1,757,888	1,622,879	31,480	275,195	March 24, 2014
MVI DoD	2,731,752	2,279,732	0	479,731	February 23, 2015
MVI BIRLS	4,208,801	4,204,049	485	977,873	January 22, 2015
MVI VAMC	4,082,170	1,765,861	12,915	1,649	February 23, 2015
VBA BIRLS				1,280,233	February 27, 2015
VBA Corporate				4,615	March 4, 2015
Enrollment Systems	4,630,014	4,630,014	19,814	360,010	March 13, 2015

Consistency of Death Sources by Number of Sources

- 2,716,125 individuals in VistA without a date of death in their records that have a date of death recorded in another source (16.2% of individuals with no date of death)

**Table 7: Distribution of Individuals
by the Number of Sources Containing a Date of Death
Number of Matching Dates**

Number of Sources with a Date of Death	Number of Individuals	All Dates of Death Match	All Years of Death Match	Min/Max Date Within 31 Days	Min/Max Date Within 366 Days
No date of death	14,033,720				
1	674,615				
2	773,684	675,200	772,087	771,249	772,813
3	392,643	329,833	390,782	389,147	391,514
4	409,267	359,299	407,472	404,199	408,221
5	213,810	190,586	212,446	210,263	212,920
6	108,173	93,567	107,495	104,267	107,754
7	110,026	98,642	109,347	107,775	109,598
8	33,829	30,540	33,530	33,384	33,630
9	78	66	77	77	77
Total 2-9	2,041,510	1,777,733	2,033,236	2,020,361	2,036,527
Total 2-9		87.1%	99.6%	99.0%	99.8%

Consistency of Death Sources by Number of Dates of Death (Percentages)

Table 9: Distribution by Number of Different Dates of Death for and Individual

Number of Different Dates of Death	Number of Individuals	All Years of Death Match	Two Parts of the Date of Death Match	Min/Max Within 31 Days	Min/Max Within 366 Days
1	2,452,348				
2	255,542	97.0%	92.3%	92.3%	98.3%
3	8,122	92.0%		81.3%	93.9%
4	112	73.2%		49.1%	76.8%
5	1	100.0%		0.0%	100.0%
Total 2-5	263,777	96.9%		92.0%	98.1%

- Most recent date of death used if more than one date
- Differences may be due to incomplete dates

Dates of Death Unique to a Source

Table 10: Individuals with a Date of Death in Only One Source by Source

Source	Number of Individuals
SSA DMF	582,598
MVI BIRLS	30,072
VBA BIRLS	26,280
Enrollment Systems	16,072
MVI DoD	9,908
CMS	9,110
VBA Corporate	405
MVI Primary View	169
MVI BOSS	1

Age Distribution of the Population By Existence of Date of Death in a Source

**Table 11: Age Distribution of Individuals
By Whether They Have a Date of Death in a Death Source**

Age on last day of 2015	Total		Without a Date of Death in Sources		With a Date Of Death in Sources	
	Number	% of Total	Number	% of Age Total	Number	% of Age Total
No date of birth	41,959	0.3%	41,951	100.0%	8	0.0%
<18	53,356	0.3%	53,245	99.8%	111	0.2%
18-19	23,229	0.1%	23,193	99.8%	36	0.2%
20-29	786,595	4.7%	784,716	99.8%	1,879	0.2%
30-39	1,424,574	8.5%	1,417,559	99.5%	7,015	0.5%
40-49	1,719,812	10.3%	1,698,799	98.8%	21,013	1.2%
50-59	2,385,930	14.2%	2,301,380	96.5%	84,550	3.5%
60-69	3,557,547	21.2%	3,315,985	93.2%	241,562	6.8%
70-79	2,419,973	14.4%	2,089,609	86.3%	330,364	13.7%
80-89	2,261,308	13.5%	1,508,919	66.7%	752,389	33.3%
90-99	1,586,249	9.5%	602,676	38.0%	983,573	62.0%
100-109	311,596	1.9%	73,228	23.5%	238,368	76.5%
110-119	146,086	0.9%	107,360	73.5%	38,726	26.5%
120-129	28,985	0.2%	12,660	43.7%	16,325	56.3%
130-139	1,935	0.0%	1,749	90.4%	186	9.6%
>139	711	0.0%	691	97.2%	20	2.8%
Total	16,749,845	100.0%	14,033,720	83.8%	2,716,125	16.2%

Analysis of Missing Dates of Death in the VHA Enrollment System

Individuals with no Date Of Death in the VHA Enrollment System Who Have a Date of Death in VBA, VistA or VHA Vital Status File Matched by SSN, Name and Year of Birth			
Enrollment Status	No Date of Death Listed in ES	Date of Death in Another Database	% With Date of Death External to ES
Cancelled/Declined	5,627	1,799	31.97%
Deceased	724	194	26.80%
No Enrollment Determination	5,467,547	1,088,392	19.91%
Not Applicable	668,430	11,958	1.79%
Not Eligible	90	25	27.78%
Not Eligible; Ineligible Date	279,727	20,253	7.24%
Not Eligible; Refused to Pay Copay	16,831	3,613	21.47%
Pending; Eligibility Status is Unverified	170,508	72,381	42.45%
Pending; Means Test Required	1,706,524	473,759	27.76%
Pending; Other	435	68	15.63%
Pending; Purple Heart Unconfirmed	301	10	3.32%
Pending;No Eligibility Code	135	47	34.81%
Rejected; Below Enrollment Group Threshold	718,558	70,401	9.80%
Rejected;Initial Application by VAMC	7,386	1,716	23.23%
Unverified	20,080	7,989	39.79%
Verified	8,377,233	598,444	7.14%
Total	17,440,136	2,351,049	13.48%

Individuals Identified as Deceased in Each Data Source

Individuals with no Date of Death in the VHA Enrollment System Breakdown by Source of Mortality Data Matched by SSN, Name and Year of Birth

Enrollment Status	VBA Deceased File (March 2015)	VA Vital Status File (CDW A06)	Vista (CDW A01 SPatient)
Cancelled/Declined	796	1,788	6
Deceased	123	139	164
No Enrollment Determination	925,889	309,770	397,166
Not Applicable	3,763	8,978	352
Not Eligible	5	24	1
Not Eligible; Ineligible Date	4,762	18,471	308
Not Eligible; Refused to Pay Copay	1,513	3,413	37
Pending; Eligibility Status is Unverified	47,373	42,830	5,526
Pending; Means Test Required	209,360	418,844	9,771
Pending; Other	45	57	1
Pending; Purple Heart Unconfirmed	8	10	0
Pending; No Eligibility Code	8	47	0
Rejected; Below Enrollment Group Threshold	29,931	69,363	149
Rejected; Initial Application by VAMC	533	1,708	1
Unverified	1,549	7,976	49
Verified	380,286	587,398	11,034
Total from each data source	1,605,944	1,470,816	424,565
Percent of total records with no date of death listed in the ES	9.2%	8.4%	2.4%

Individuals “Pending” an Enrollment Decision but Likely Deceased

Health Benefits Applications In-Process (no Enrollment Decision)			
Enrollment Status	No Date of Death Listed in ES	Date of Death in an External Database	% with External Date of Death
Pending; Eligibility Status is Unverified	170,508	72,381	42.45%
Pending; Means Test Required [with no prior means test on file]	677,374	166,276	24.55%
Total without an enrollment decision	847,882	238,657	28.15%

- 238,657 (28%) of the 847,882 records without an enrollment decision have a date of death in at least one of the three databases reviewed.
- An automated process that would push missing dates of death to the Enrollment System could clean up approx. one out of every four pending applications in the Enrollment System.

Conclusions

- There are 2,716,125 individuals in VistA without a date of death in their records that have a date of death recorded in another source (16.2% of individuals with no date of death)
- The SSA Death Master File provides the largest number of missing death dates, followed by BIRLS.
- Additionally, the SSA Death Master File provides over 500,000 dates of death that are not found in any other source.
- Prior and recent analyses of Enrollment System records provided similar results as this subgroup's analysis of VistA records.
 - 2.35 million (13.5%) of the 17.4 million records with no date of death in the Enrollment System have a date of death in another source (excluding SSA Death Master File).
- Establishing a process to use these sources to capture missing dates of death will greatly enhance the VHA's death ascertainment process.

Issues/Recommendations to Research or Address

- Negotiation of new contract with SSA
- Expand matching criteria with the SSA DMF to include name.
- Expand matching criteria with VBA BIRLS and Corporate Files to include name.
- Investigate individuals with a VBA BIRLS data of death but no corresponding MVI BIRLS correlation.
- Investigate individuals with an ICN in VistA that is not an active ICN in the MVI.
- Investigate individuals with MVI VAMC correlation containing a date of death without a date of death in VistA.
- Investigate individuals with a date of death in the MVI Primary View (NCA dates of death) but not in the MVI BOSS or MVI AMAS Correlations (and vice versa).
- Investigate individuals over 100 years of age.
- Develop criteria to select a date of death when more than one date of death is in the sources

Questions



Analyses Purposes

- Support the development of procedures and processes to update a individual's date of death.
- Two Analyses
 - Date of Death Sources
 - Evaluate date of death sources and their consistency and usefulness in ascertaining whether individuals are deceased.
 - Activity After Death
 - Evaluate activity after an individual's date of death and develop an algorithm to validate a date of death and assess the risk of accepting the date of death without further validation.

Population

- Individuals from Date of Death Sources Analysis
 - 2,716,125 individuals without a date of death in VistA, but a date of death in other sources
- Exclude
 - Patients whose ICN was no longer in the CDW on March 20, 2015 (44)
- Total individuals in the population without a date of death
 - 2,716,081

VHA Activity Sources

Extract from CDW on March 20, 2015

- Appointment
- Visit
- Outpatient Prescription Fill
- Surgery (Inpatients and Outpatients)
- Inpatient Stay
- Immunization Recorded
- Purchased Care

VBA Compensation and Pension Payments to Veterans and Beneficiaries

- VETSNET File Created February 26, 2015
 - Contained active and terminated awards
 - Match on SSN

**Table 2: Distribution of Award Records on the VETSNET
for the Analysis Population
by Award Status**

Award Status	Total Records	Last Paid Date on Record	Date of Death on Record	No Last Paid Date on the Record
Active	6,197	6,197	46	0
Suspended	3,309	3,309	122	0
Terminated	431,789	233,052	365,879	198,737
Total	441,295	242,558	366,047	198,737

- 303,479 individuals when match on SSN plus MVI DOB and Gender and there is a date last paid or a date of death on the record

Activity After Death

- 10.6% of Individuals had some activity after their date of death
- < 1% had activity in the last two years if their date of death was more than 2 years in the past
- Most common activity
 - C&P payment (5.0%)
 - Visit (5.5%)
 - Prescription Fill (1.6%)
 - Appointment (1.6%)
- Individuals who died in a VHA facility had activity after death
- Most individuals had just one (66%) or two events (17%) after death
- Comparison group - 238,159 deaths with a source of death equal to “INPATIENT AT VAMC”
 - 55.2% had activity after death

Activity After Death Summary

Summary of Activity After Death				
Type of Activity	All Deaths	DOD Before March 6, 2013	DOD Between March 6, 2013 and March 5, 2014	Died in VHA Facility
Any Activity	10.6%	8.5%	20.4%	55.2%
In Last 2 Years	7.2%	0.9%	4.3%	18.7%
In Last Year	4.4%	0.4%		9.9%
> Two Years After Death	1.9%	2.2%		1.7%
> One Year After Death	2.4%	2.7%	1.1%	3.9%

- Activity percentages especially for dates of death in less recent years may be affected by the cutoff date for activity in the CDW (October 1, 1999).
 - Results for deaths in 2000 or later were similar

Activity After Death By Number of Events

Table 6: Activity after Death by Number of Events

Number of Events	Individuals	
	Number	Percent
1	188,621	65.6%
2	50,006	17.4%
3	18,497	6.4%
4	10,445	3.6%
5	5,342	1.9%
6	3,652	1.3%
7	2,314	0.8%
8	1,587	0.6%
9	1,069	0.4%
10	803	0.3%
11-99	3,647	1.3%
100-199	516	0.2%
200-299	303	0.1%
300-399	197	0.1%
400-499	145	0.1%
500-599	105	0.0%
600-699	89	0.0%
700-799	75	0.0%
800-899	46	0.0%
900-999	36	0.0%
1,000-14,403	247	0.1%
Total	287,742	100.0%

Activity After Death by Source for Individuals with One or Two Events

Table 7: Type of Activity after Death for Individuals with only One Event

Type of Activity	Individuals		
	Number	Within 31 Days	% Within 31 Days
C&P Payment	110,091	83,738	76.1%
Visit	63,689	17,428	27.4%
Prescription Fill	10,852	7,595	70.0%
Purchased Care	1,806	765	42.4%
Surgery	1,326	123	9.3%
Immunization	753	26	3.5%
Appointment	85	20	23.5%
Inpatient Stay	19	13	68.4%
Total	188,621	109,708	58.2%

Table 8: Type of Activity after Death for Individuals with only Two Events

Event Types	Number	Within 31 Days	% Within 31 Days
Appointment and Visit	19,629	3,549	18.1%
Two Visits	11,428	2,803	24.5%
C&P Payment and Visit	8,418	3,564	42.3%
Two Prescription Fills	3,777	2,216	58.7%
Prescription Fill and Visit	2,837	1,106	39.0%
C&P Payment and Prescription Fill	2,052	1,332	64.9%
Visit and Immunization	769	12	1.6%
Visit and Purchased Care	293	124	42.3%
Other Combinations	803	261	24.4%
Total	50,006	14,967	29.9%

Research into Activity after Death – C&P and Inpatient

- Most C&P payments within 31 days of death (first of the month following the date of death)

**Table 9: Last Compensation and Pension Payment
after the Date of Death**

Payment Type	Number Within 31 Days	% Within 31 Days	Number Within 62 Days	% Within 62 Days	Number Within 366 Days	% Within 366 Days	Total	Active Award
Any Payment	102,957	76.4%	118,954	91.8%	130,820	98.8%	134,811	3,659
Payment is the only event after death	83,738	76.1%	97,096	91.7%	107,376	98.8%	110,091	2,151

Research into Activity after Death - Visit

- 63,689 individuals with only one visit after their date of death
- Reviewed 5 cases (3 EKG) and none had information indicating the patient was still living other than the visit.

**Table 11: Stop Codes on Visits
for Individuals with only a Visit after Death**

Stop Code	Stop Code Name	Number of Visits	Within 31 Days of Death	
			Number	Percent
Primary Stop Codes				
674	ADMIN PAT ACTIVITIES (MASNONCT)	8,714	2,716	31.2%
323	PRIMARY CARE/MEDICINE	8,026	2,258	28.1%
147	TELEPHONE/ANCILLARY	3,607	1,672	46.4%
102	ADMITTING/SCREENING	3,021	378	12.5%
301	GENERAL INTERNAL MEDICINE	2,264	293	12.9%
324	TELEPHONE/MEDICINE	2,173	838	38.6%
338	TELEPHONE PRIMARY CARE	2,120	1,071	50.5%
108	LABORATORY	2,074	156	7.5%
103	TELEPHONE TRIAGE	2,055	638	31.0%
166	CHAPLAIN SERVICE - INDIVIDUAL	1,424	211	14.8%
502	MENTAL HEALTH CLINIC - IND	1,388	400	28.8%
125	SOCIAL WORK SERVICE	1,364	438	32.1%
107	EKG	1,011	49	4.8%
165	BEREAVEMENT COUNSELING	50	34	68.0%
Secondary Stop Codes				
117	NURSING (2ND ONLY)	2,493	1,085	43.5%
125	SOCIAL WORK SERVICE	2,212	1,120	50.6%
165	BEREAVEMENT COUNSELING	8	2	25.0%

Research into Activity after Death - Prescription

- 10,852 individuals with only one prescription fill after death
 - 7,585 were within 31 days of death (70%)
 - 1,197 had the date of death falling between the fill date and the release date
 - Most of the prescriptions were processed by a CMOP (83%)
 - Most prescriptions were mailed (91%)
 - Review of 927 prescriptions picked up at a window
 - Unusual number of prescriptions (76 prescriptions) filled at one station for controlled substances (oxycodone, hydromorphone, diazepam, etc.) between October 12, 2000 and December 31, 2001
 - Date of the prescription fill was often years after the date of death, and was on average almost 12 years after the date of death.

Research into Activity after Death – 100 or More Events

1,759 individuals with 100 or more events after their date of death

- 1,200 (68%) had only one death source with a date of death
- One case had a date of death only from the Department of Defense. First VHA activity after date of death and more than 2,000 events.
- Another case had a date of death in the SSA Death Master File. Appeared to be transposed digits in the month of death ('01-22-2014' rather than '10-22-2014') that resulted in activity after death.

Table 12: Death Sources for Individuals with 100 or More Events after Death

Death Source	Number of Individuals with death in the source	% of Individuals with death in the source	Number of Individual with death in one source
SSA Death Mast File	67	3.8%	41
MVI BIRLS Correlations	753	42.8%	245
VBA BIRLS	564	32.1%	60
Enrollment Systems	454	25.8%	415
MVI DoD Correlations	328	18.6%	294
Centers for Medicare and Medicaid Services	150	8.5%	123
VBA Corporate Database	22	1.3%	22
MVI Primary View	29	1.6%	0
MVI BOSS	14	0.8%	0
MVI AMAS	16	0.9%	0
Total	1,759*		1,200

*Sum of column does not equal the total because an individual may have a date of death in multiple sources.

Possible Algorithm – Cases to Research

- 127,825 deaths in past 6 months excluded from algorithm (September 6, 2014 – March 5, 2015)

Table 13: Possible Algorithm to Select Individuals for Updating Dates of Death		
Action and Criteria	Number of Individuals	Individuals Remaining in the Population
Beginning Population:		
Individuals with a date of death at least 6 months in the past (before September 6, 2014)	2,588,256	
Research individuals with:		
Active Award	1,272	2,586,984
Suspended Award	629	2,586,355
Future Appointments	1,539	2,584,816
Date of Death Before Date of Birth	124	2,584,692
Age Less than 18 years of age at death	503	2,584,189
Age greater than 110	84	2,584,105
100 or more events after date of death	696	2,583,409
Total to Research	4,847	

Possible Algorithm – Cases to Update

Table 13: Possible Algorithm to Select Individuals for Updating Dates of Death		
Action and Criteria	Number of Individuals	Individuals Remaining in the Population
Update date of death for individuals with:		
No activity	2,333,019	250,390
Only C&P payments after death (terminated awards)		
No activity in the last six months (before September 6, 2014) and Only one healthcare event after death or All events within 31 days after death	91,167	159,223
No activity in the last year (before March 6, 2014) and all events within 182 days after death	21,794	43,966
No activity in the last two years (before March 6, 2013) and all events within 365 days after death	5,437	38,529
No activity in the last three years (before March 6, 2012) and all events within 729 days after death	3,357	35,172
Total to Update	2,548,237	

Conclusions

- Only 287,742 individuals (10.6%) out of 2,716,081 individuals without a date of death in VistA but a date of death in another source had activity after the date of death from the other source(s)
- Most (66%) of the individuals with activity had only one event (a compensation or pension payment or health care activity)
- Development of an algorithm to identify individuals whose date of death could be updated from the other sources is feasible.
- Further research into individuals with activity after the date of death may allow refinement of an algorithm and the criteria for identifying activity after death.

Issues to Research or Address

- Individuals with matching SSN but no matching demographics on VETSNET File and SSA DMF
 - Use MVI probabilistic matching
- Additional research of individuals with activity after date of death
- Refinement of the algorithm to identify individuals whose date of death could be updated
- Next groups to analyze (quality of death dates in VistA and ES)
 - Inconsistent dates of death in records
 - Death dates in records compared to sources
- Quality of NCA dates of death

Questions

