

2010-2011 VIReC Database and Methods Cyber Seminar Series



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Improving Mortality Ascertainment Using the VHA Vital Status File

May 2, 2011

Presented by:
Noreen Arnold



Session Objectives

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 - Describe recent research and methods regarding mortality ascertainment using VA data and other sources.
 - Describe limitations of using the VHA Vital Status File to ascertain mortality.
- **Out of scope**
 - Cause of death



Session Topics

- Sources of mortality data
- VHA Vital Status File (VSF) Background/Creation/Contents
- Examples of published VA studies that have validated mortality data
- Future Enhancements
- Where to go for more help



Audience Poll

- **Have you ever used the VHA VSF?**
 - 1 Yes, including the Master File
 - 2 Yes, Only the Mini File
 - 3 No

Audience Poll

- **How would you rate your overall knowledge of VHA VSF?**
 - 1 (Never Used)
 - 2
 - 3
 - 4
 - 5 (Used Frequently, Very familiar)

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Sources of Mortality Data in the VA

- **BIRLS Death File**

- VA Death File
- Extract from the **B**eneficiary **I**dentification and **R**ecords **L**ocator **S**ystem (BIRLS) database
- Produced by the Veterans Benefit Administration
- ~64-80% of veteran deaths depending on age^{1,2} (veterans known to VA)
- Updated monthly
- Austin Information Technology Center (AITC)



Sources of Mortality Data in the VA

- **VA Medicare Vital Status File**

- Veterans enrolled in Medicare
- Received from Centers for Medicare & Medicaid Services (CMS) annually
- Current through creation date
 - Latest creation date: December 31, 2009
 - Next update:
 - Creation date October 31, 2010; In VSF July 2011
- Mainly over 65 population
- ~83% of veteran deaths¹
- Available from VIREC



Sources of Mortality Data in the VA

▪ **SSA Death Master File**

- Received from **Social Security Administration**
- More complete for over 65 population³
- Individuals enrolled in SSA program since 1936
- Contains deaths occurring outside United States
- ~89-95% of veteran deaths depending on age group^{1,2}
- Updated monthly
- Maintained by AITC



Sources of Mortality Data in the VA

■ Inpatient Deaths

- Medical SAS Inpatient Datasets (PTF)
 - Deaths occurring in VA hospitals
- Fee basis inpatient data
 - Deaths occurring in non-VA hospitals when cost of inpatient care covered by VA
- ~5%-12% of veteran deaths^{1,2}
- AITC

Other Sources of Mortality Data Not Available in VA

■ Death Certificates

- State Vital Statistics Offices
- National Death Index (NDI)
 - Gold standard for death ascertainment
 - Maintained by the National Center for Health Statistics
 - Costly
 - Annual update - 18 month time lag
 - 2009 deaths due to be released in June 2011
- Contain cause of death
 - Cause specific mortality



Other Sources of Mortality Data Not Available in VA

■ SSA Epidemiological Search

- Provides date of death
- Validates SSN
- Provides 'presumed living' status
 - Based on SSA administrative data including:
 - Payroll deductions, railroad retirement or disability payments, death claims filed by beneficiaries⁴
 - Reduce loss to follow up
- Deaths occurring outside the US
- Fees

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VHA VSF Background

■ **Impetus for development of VHA VSF**

- Mortality is a common outcome measure in research
- Conflicting results using single data sets
 - More deaths in Medicare VSF than BIRLS Death File

■ **VIReC VA-NDI Mortality Data Merge Project (2003, SDR 03-157)**

- Recommended the creation of a new VA file of combined mortality data
- VIReC Technical Report 2: VA-NDI Mortality Data Merge Project (2006)



VSF Available in 2006

■ Owner

- Built by National Data Systems (NDS)
- First available in October 2006

■ Data access information

- Access information available on NDS website:
- <http://vaww4.va.gov/NDS/DataAccess/Researchers/RESViStat.asp>

■ Updated Quarterly

■ Veterans alive on or born after 10/1/1991

■ Composed of three files

- Master, Mini, and SSN Conversion



VSF – Three Files

■ Master

- Users of VHA or VBA
- One record per SSN/DOB/Sex combination
- Over 22 million records (15.8 million SSNs)
 - 10.2 million SSNs with one record
 - 5.6 million SSNs with multiple records
 - 1.7 million non-veteran SSNs
- 112 variables
- Sort sequence of the master file:
 - SCRSSN, descending score, DOB, sex



VSF – Three Files

■ Mini

- One record per SSN
- Combined data
- Over 14 million records
- 16 variables
- Sort sequence: SCRSSN

■ SSN Conversion

- Scrambled to Real



Matching Cohort to VSF

■ Decisions

- Use Mini File?
- Use Master File?
- Match on SSN, DOB, Sex?
 - All must match
 - Partial match (e.g., just year and sex)

■ Possible Issues

- Demographics do not match
- Activity after date of death
 - 4.8% of deaths more than 31 days after last activity

■ Understand Construction of the File

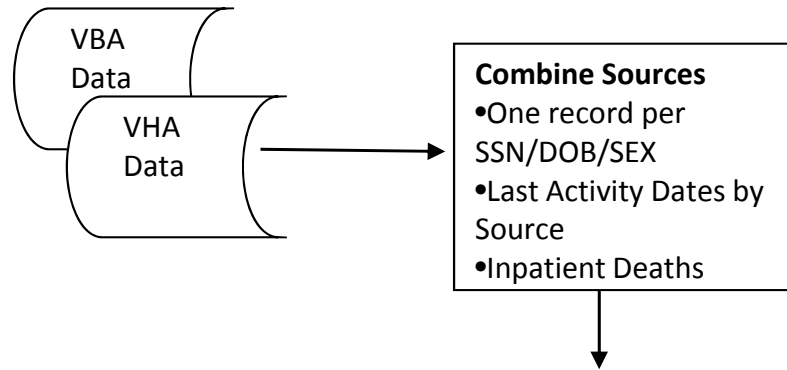


Construction of the VHA VSF

NDS Methodology



Construction of the VHA VSF – NDS Methodology



Merge on SSN/DOB/SEX

Construction of the Master File

■ Combine VA Data Sources

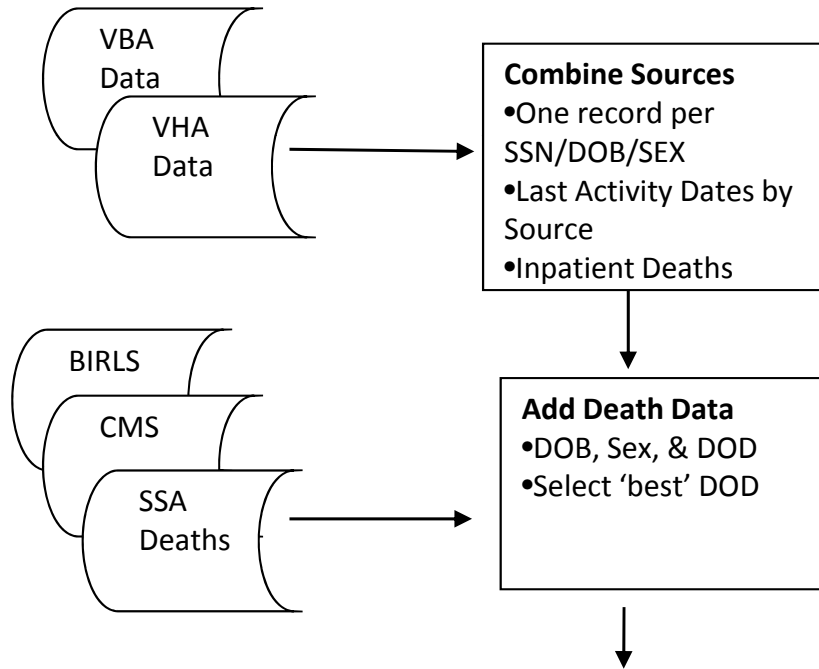
- Data Sources for SSN/DOB/Sex key combinations
 - Medical SAS Inpatient Datasets and Census (PTF)
 - Inpatient and Outpatient Encounter (ENC)
 - Non-VA care or Fee Files (FEE)
 - DSS Pharmacy Files (DSS)
 - Enrollment (ENR)
 - VBA Compensation and Pension Files
 - Veterans Service Network (VETSNET) Corporate Mini Master File (VETSNET File)
 - Compensation and Pension Mini Master File (C&P Mini File)



Construction of the Master File

- **Combine VA Data Sources (cont.)**
 - Data Contributed
 - Date of last utilization or activity
 - Inpatient death dates (PTF and FEE)

Construction of the VHA VSF – NDS Methodology



Merge on SSN/DOB/SEX

Merge on SSN Only

What is 'best'?

- **Use of a routine to select the value for a demographic variable (DOB, DOD, Sex) associated with an SSN when more than one value for that variable is found in the source data**
- **Goal is to select the true value for the variable in the majority of cases**

Construction of the Master File

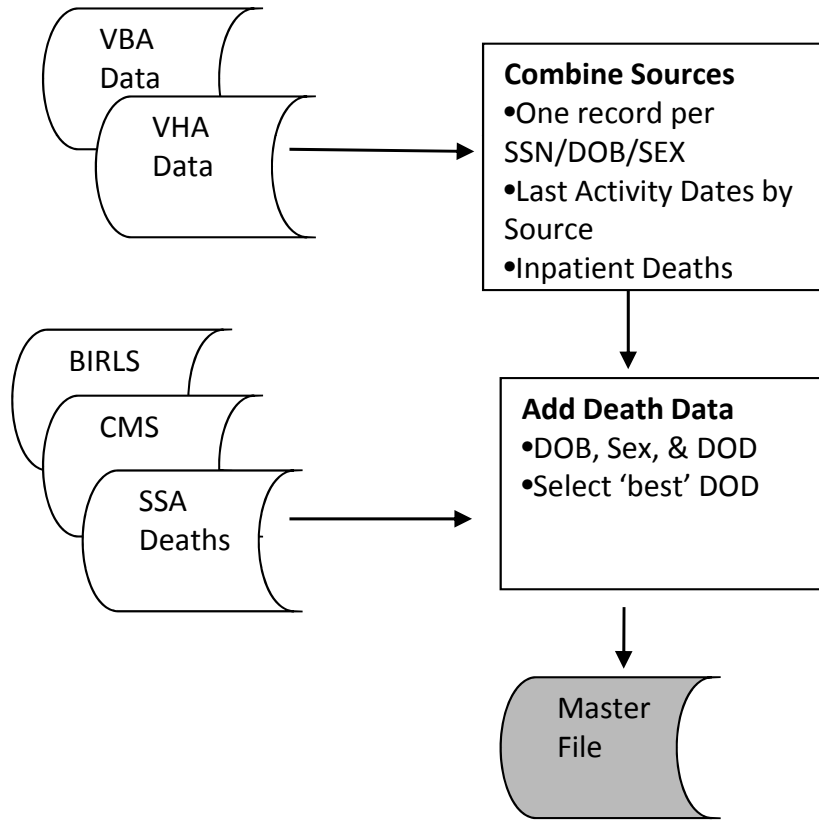
■ Add Death Data

- CMS Medicare data
 - Date of last utilization
 - Race
 - Submission flag by year (CMS_INDYY)
- SSA Death File
 - Does not contain Sex
- BIRLS Death File
- Matched to VA data on **SSN only**
- Demographics (DOB and Sex) and DOD

Construction of the Master File

- **Select 'best' date of death for each SSN/DOB/Sex combination**
 - Select inpatient DOD if present (PTF or FEE)
 - See Appendix A for selection routine from all DOD sources (Inpatient, Medicare, SSA, BIRLS)
 - Put in DOD variable on the Master File record

Construction of the VHA VSF – NDS Methodology



Merge on SSN/DOB/SEX

Merge on SSN Only

Contents of the Master File

- **One record for each VA SSN/DOB/SEX combination**
- **DOB and SEX**
 - One set of DOB/Sex variables for each source of VSF data
 - All VA source variables have the same DOB/Sex
 - BIRLS, Medicare, and SSA matched on SSN only and may have different DOB and/or Sex
- **DOD**
 - From Medicare, BIRLS, Inpatient (PTF & FEE), and SSA

Contents of the Master File

■ **Last activity dates**

- VA sources and Medicare
- Medicare date exclusions
 - DME (durable medical equipment) and Unpaid Carrier claims

■ **Veteran Flags**

- Based on means test variables and other veteran indicators
- Outpatient, Inpatient, Enrollment, and Compensation and Pension



Contents of the Master File

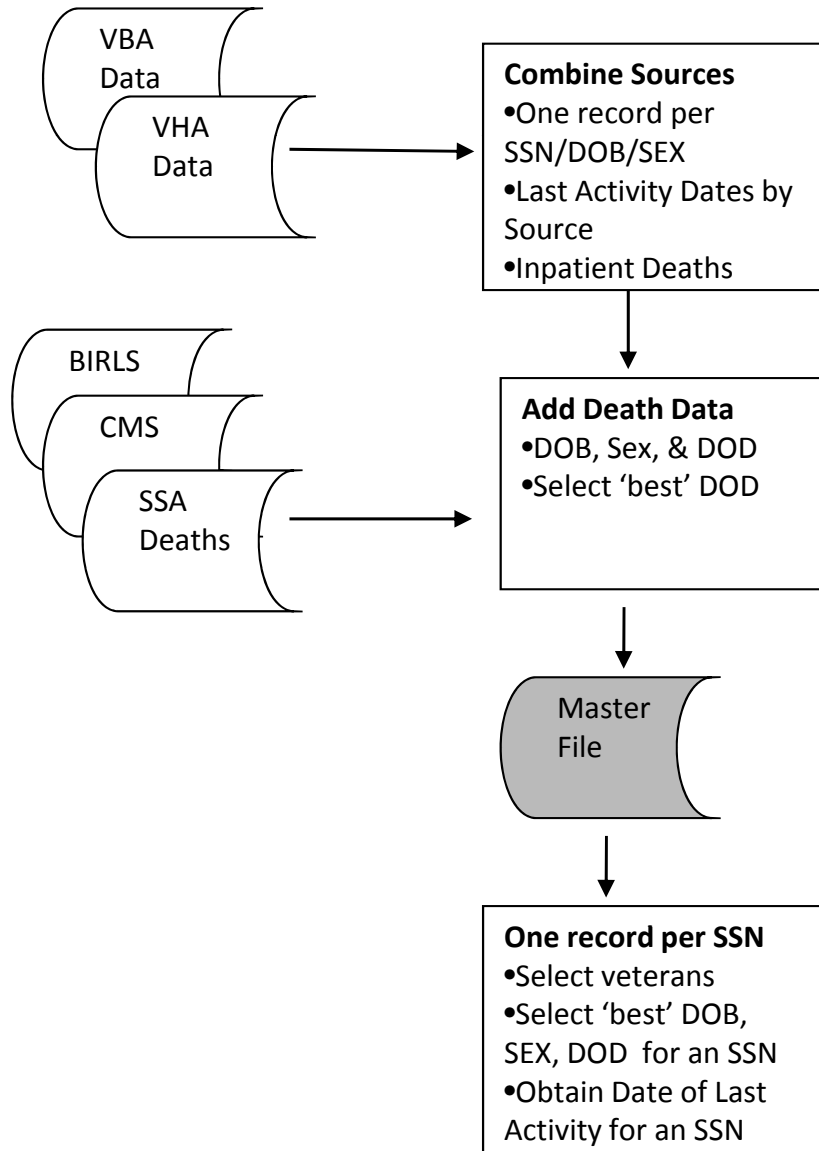
■ Medicare information

- Race
- Submission flag by year (CMS_INDYY)
 - 0 = 'Not Submitted'
 - 1 = 'Submitted/Not Enrolled'
 - 2 = 'Submitted/Enrolled'

■ Quality of the date

- "Indicator"
- Indicates if full or partial data present in source (e.g., month, day, and year present; only year present, etc.)

Construction of the VHA VSF – NDS Methodology



Merge on SSN/DOB/SEX

Merge on SSN Only

Combine data into
One Record Per SSN

Construction of the Mini File

- **Select only Veteran records**
- **Scenario 1: One record for an SSN on the Master File**
 - Use DOB and Sex on record
 - Use 'best' DOD on record
- **Scenario 2: Multiple records for an SSN on the Master File**
 - Multiple DOB/Sex combinations
 - Select 'best' DOB/Sex from all records
 - Select 'best' DOD from all records

Construction of the Mini File

■ Scenario 2: Multiple records for an SSN on the Master File

- Select 'best' date of birth for each SSN among the SSN/DOB/Sex combinations
 - Select 'best' utilization DOB date
 - Based on scoring method (Score range: 0 to 40)
 - » Priority: PTF, Encounter, DSS, FEE
 - » Extra points if complete date, sex present, matches BIRLS, SSA or Medicare
 - See Appendix B for selection routine from all DOB sources (Utilization, Medicare, SSA, BIRLS, Enrollment, VBA C&P)

Construction of the Mini File

■ Scenario 2: Multiple records for an SSN on the Master File

- Select 'best' Sex for each SSN among the SSN/DOB/Sex combinations
 - Similar to selection of best DOB
- Select 'best' date of death among the SSN/DOB/Sex combinations
 - Select inpatient DOD if present (PTF or FEE)
 - See Appendix A for selection routine from all DOD (Inpatient, Medicare, SSA, BIRLS)

Construction of the Mini File

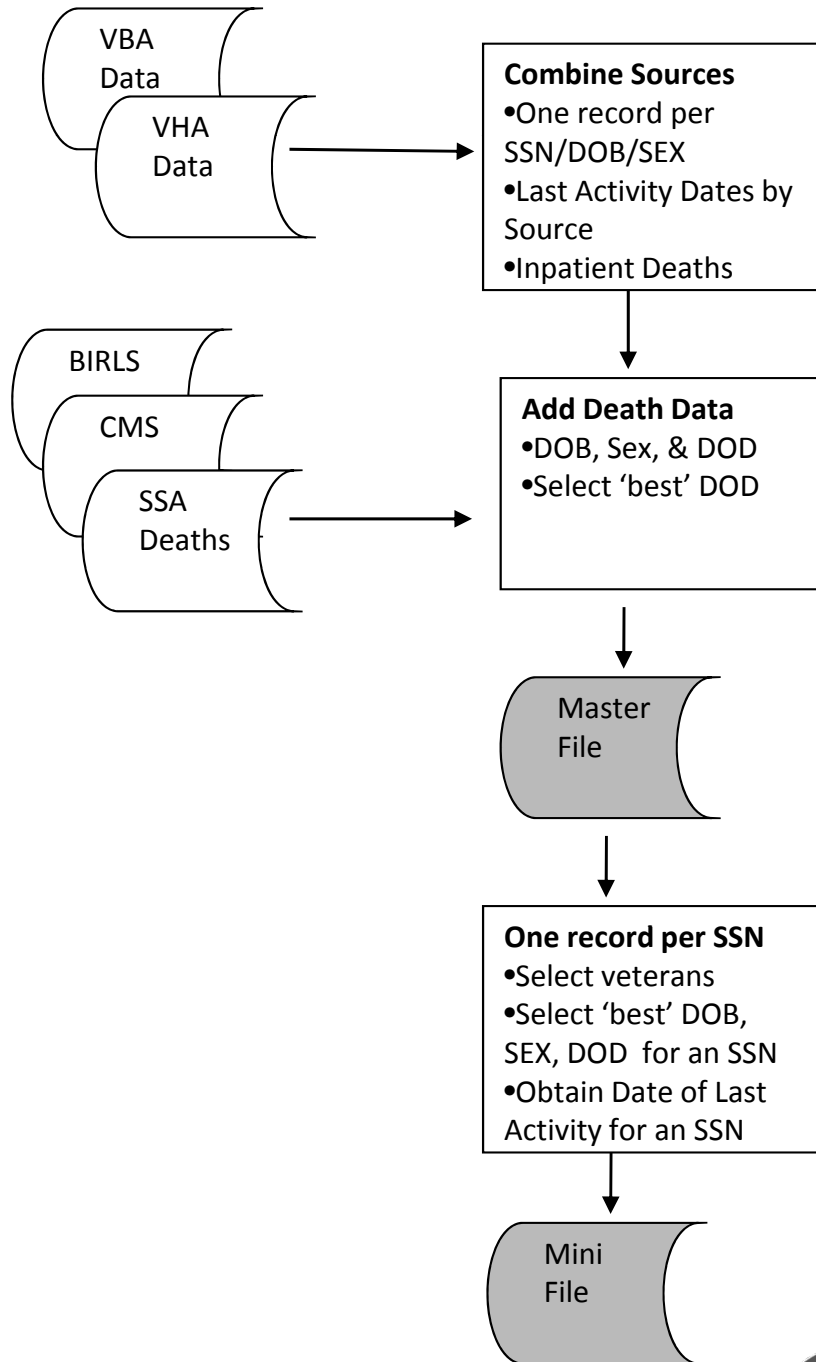
- **Select last activity (two dates)**
 - Utilization (health care)
 - All activity (health care and benefits)
 - From all SSN/DOB/Sex combinations for an SSN
- **Presumed living status**
 - '0': no death date
 - '1': death date
 - '2': death date and health care usage more than 31 days after death

Construction of the VHA VSF – NDS Methodology

Merge on SSN/DOB/SEX

Merge on SSN Only

Combine data into
One Record Per SSN



Contents of the VHA VSF Mini File

- One record per SSN
- 'Best' DOB, Sex, DOD
- Last health care utilization date
- Last activity date
- Presumed living status
- Source indicators
 - DOB, DOD, and utilization dates



Contents of the VHA VSF Mini File

■ DOB Source

– VSF Mini created 1/24/2011

Source	Number	Percent
Encounter	7,631,583	54.0%
Inpatient (PTF)	3,633,420	25.7%
Medicare Vital Status	1,358,684	9.6%
Enrollment	1,046,359	7.4%
VBA C&P Files	317,587	2.2%
SSA Death Master	88,459	0.6%
DSS Pharmacy	28,094	0.2%
Fee Basis	22,858	0.2%
BIRLS Death File	2,888	0.0%
Total Records	14,129,932	100.0%



Contents of the VHA VSF Mini File

■ DOB Consistency

– VSF Master created 12/12/2010

Records	Number
Total	19,869,512
SSNs for Veterans	14,009,035
> 1 Gender	1.4%
> 1 DOB	36.0%
Conflicting DOB parts	7.3%

Contents of the VHA VSF Mini File

■ DOD Source

– VSF Mini created 1/24/2011

Source	Number	Percent
Medicare Vital Status	2,474,211	56.3%
SSA Death Master	1,066,916	24.3%
Patient Treatment File	643,239	14.6%
Birls Death File	145,396	3.3%
Fee Basis	65,592	1.5%
Total Deaths	4,395,354	100.0%

Back to Possible Issues

- **Demographics do not match**

- **Activity after date of death**

- **Examples**

- SCRSSN 11111

- VSF DOB does not match patient DOB

- SCRSSN 22222

- Last activity date is more than two years after death

- SCRSSN 33333

- VSF DOB and sex do not match patient DOB and sex and the last activity date is after the death date

Example 1

Patient demographics: Male born 7/15/1944

Master File Records

SSN	DOB	SEX	ENC DOB	ENC SEX	ENC Last Date	PTF DOB	PTF SEX	PTF Last Date	CMS DOB	CMS SEX	CMS Last Date	CMS DOD
11111	7/01/1944	M	<u>7/01/1944</u>	M	4/10/1992	7/01/1944	M	4/22/1992	7/15/1944	M	8/5/2006	9/10/2006
11111	7/15/1944	M	<u>7/15/1944</u>	M	9/5/2006				7/15/1944	M	8/5/2006	9/10/2006

Two records for the SSN: different DOB on Encounter

One source of death data: CMS (Medicare)

Example 1

Patient demographics: Male born 7/15/1944

Master File Records

SSN	DOB	SEX	ENC DOB	ENC SEX	ENC Last Date	PTF DOB	PTF SEX	PTF Last Date	CMS DOB	CMS SEX	CMS Last Date	CMS DOD
11111	7/01/1944	M	7/01/1944	M	4/10/1992	7/01/1944	M	4/22/1992	7/15/1944	M	8/5/2006	9/10/2006
11111	7/15/1944	M	7/15/1944	M	9/5/2006				7/15/1944	M	8/5/2006	9/10/2006

Death data added on SSN only

Mini File Record

SSN	DOB	SEX	UTL Last Date	UTL SRC	DOD	DOD SRC	Living IND
11111	7/01/1944	M	9/5/2006	ENC	9/10/2006	CMS	1

'best' DOB selected

Most recent UTL date selected

Deceased



Example 2

Patient demographics: Male born 7/15/1944

Master File Records

SSN	DOB	SEX	ENC DOB	ENC SEX	ENC Last Date	PTF DOB	PTF SEX	PTF Last Date	CMS DOB	CMS SEX	CMS Last Date	CMS DOD
22222	7/15/1953	M	<u>7/15/1943</u>	<u>M</u>	9/1/2006	7/15/1943	M	4/22/1981	7/15/1944	M	9/8/2006	9/10/2006
22222	8/30/1980	F	<u>8/30/1980</u>	<u>F</u>	6/12/2009				7/15/1944	M	9/8/2006	9/10/2006

Two records for the SSN: different DOB and sex on Encounter
One source of death data: CMS (Medicare)



Example 2

Patient demographics: Male born 7/15/1944

Master File Records

SSN	DOB	SEX	ENC DOB	ENC SEX	ENC Last Date	PTF DOB	PTF SEX	PTF Last Date	CMS DOB	CMS SEX	CMS Last Date	CMS DOD
22222	7/15/1953	M	7/15/1943	M	9/1/2006	7/15/1943	M	4/22/1981	7/15/1944	M	9/8/2006	9/10/2006
22222	8/30/1980	F	8/30/1980	F	6/12/2009				7/15/1944	M	9/8/2006	9/10/2006

Death data added on SSN only

Mini File Record

SSN	DOB	SEX	UTL Last Date	UTL SRC	DOD	DOD SRC	Living IND
22222	7/15/1943	M	6/12/2009	ENC	9/10/2006	CMS	2

Most recent UTL date selected

Activity after death

Example 3

Patient demographics: Male born 5/31/1968

Master File Records

SSN	DOB	SEX	PTF DOB	PTF SEX	PTF Last Date	SSA DOB	SSA DOD	CMS DOB	CMS SEX	CMS Last Date	CMS DOD
33333	8/30/1980	<u>F</u>	8/30/1980	F	5/9/2009	<u>5/31/1968</u>	11/18/2005	<u>5/31/1968</u>	<u>M</u>	11/09/2005	11/30/2005

One Record for the SSN

Two sources of death data: CMS (Medicare) & SSA



Example 3

Master File Records

SSN	DOB	SEX	PTF DOB	PTF SEX	PTF Last Date	SSA DOB	SSA DOD	CMS DOB	CMS SEX	CMS Last Date	CMS DOD
33333	8/30/1980	F	8/30/1980	F	5/9/2009	5/31/1968	11/18/2005	5/31/1968	M	11/30/2005	11/30/2005

Death data added on SSN only

Mini File Records

SSN	DOB	SEX	UTL Last Date	UTL SRC	DOD	DOD SRC	Living IND
33333	8/30/1980	F	5/9/2009	ENC	11/18/2005	SSA	2

Most recent UTL date selected

'best' DOD selected

Activity after death

Points to Consider

- You may find inconsistencies between VHA VSF demographics and your cohort demographics
- To resolve these inconsistencies the Master file will be useful
- VHA VSF should not be used for business operations regarding individual veterans

Possible Strategy

- **Use the Mini File for the initial search for deaths**
 - Match on SSN
- **Use the Master File to investigate unusual cases, for example:**
 - Cohort DOB/Sex do not match Mini DOB/Sex
 - May be records on the Master File with matching demographics
 - Activity after death
 - Check DOB/Sex for DOD sources on Master File
 - Are all DOD on Master File the same?

Possible Strategy

- **Consider additional validation steps**
 - Compare the DOB and Sex for the DOD source on the Master File to cohort DOB and Sex for all deaths
 - Use the NDI or State Vital Statistics Offices for cases lost to follow up
 - No death date
 - No VHA or VBA activity after end of follow up
 - Remember NDI has 18-month lag
- **Use NDI or State Vital Statistics Offices for cause of death**

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VA Validation Studies

- **Sohn, et al “Accuracy and completeness of mortality data in the Department of Veterans Affairs”**
 - Sample of 3,000 Veterans alive on 1/1/1999, 4.8% females
 - 292 deaths from 1999-2002
 - Gold standard: NDI
 - BIRLS, PTF, Medicare, SSA
- **Savas, et al “Mortality Ascertainment of Women Veterans: A Comparison of sources of Vital Status Information, 1979-2002”**
 - 6,297 deceased women Veterans
 - Texas death certificate record 1979-2002
 - US National Registry of Women Veterans
 - Gold standard: Texas mortality database
 - BIRLS, PTF, SSA



VA Validation Studies

■ Sensitivity by age

- % gold standard's deaths found in source
- Sohn

Age	BIRLS	SSA	Combined
< 65	67.6	91.5	95.8
65 or older	80.5	92.3	99.1

- Savas

Age	BIRLS	SSA	Combined
25-44	64.0	88.7	93.9
45-64	76.7	93.2	97.8
65 or older	81.5	95.6	98.4

VA Validation Studies

■ Sensitivity by data source

Study	SSA	Medicare	BIRLS	PTF	All Sources
Savas	93.8	N/A	77.2	5.2	97.5
Sohn	92.1	83.2	77.4	12.0	98.3

■ Conclusions

- BIRLS should not be used alone
- All sources provide unique cases
- Sensitivity decreases with age

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Future Enhancements

■ **VIReC Data Quality Review**

- Quantifying missing and conflicting demographics (DOB, Sex, DOD)
- Evaluating best DOB selection methodology
- Investigating cases of activity after death
- Technical report

■ **Medicaid Data**

- Under 65 deaths



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Help

■ National Data Systems

- Dorothea Garrett
- Larry Hughes
- <http://vaww4.va.gov/NDS/DataAccess/Researchers/RESViStat.asp>

■ VI ReC Webpage

<http://www.virec.research.va.gov>

- Information on VA data sources and how to access data
- Documentation on some VA datasets, i.e.,



Help (cont'd)

■ HSRData Listserv

- Join at the VIREC Web site
- Discussion among >500 data stewards, managers, and users
- Past messages in archive (on intranet)

■ VIREC Help Desk

- VIREC staff will answer your question and/or direct you to available resources on topics
- VIREC@va.gov
- (708) 202-2413



Questions?



Next Seminar

6/6/2011

1:00pm

Overview of VA Data, Information Systems, National Databases and Research Uses VIREC Database and Methods Seminar

Presented by:

Denise M. Hynes, PhD, MPH, RN



References

1. Savas LS, del Junco DJ, Bastian LA, Vernon SW. Mortality ascertainment of women veterans: a comparison of sources of vital status information, 1979-2002. *Med Care* 2009;47:125-128.
2. Sohn MW, Arnold N, Maynard C, Hynes DM. Accuracy and completeness of mortality data in the Department of Veterans Affairs. *Popul Health Metr* 2006;4:2.
3. Hill ME, Rosenwaik I. The Social Security Administration's Death Master File: the completeness of death reporting at older ages. *Soc Secur Bull* 2001;64:45-51.
4. Doody MM, Chimes K. The Social Security Administration "presumed living" search. *Am J Public Health* 2000;90:1948-1949.

Appendix A

Best Date of Death for VHA Vital Status File

1. If all sources (Inpatient, BIRLS, Medicare, SSA) have a different date:

- If complete inpatient death date present use inpatient death date ; otherwise
- If Medicare death date present and the day was not equal to 28, 30, and 31, use the Medicare date; otherwise
- If SSA death date present and the day is not equal to 00, 01, and 15, use the SSA date; otherwise
- If BIRLS death date present use the BIRLS date; otherwise
- If Medicare death date present and the day equals 28, 30, or 31 use the Medicare date; otherwise
- If SSA death date present, use the SSA date.

2. If all sources have a date and the external dates (SSA and Medicare) matched and the internal dates (Inpatient and BIRLS) matched but the external dates did not match the internal dates, use the inpatient death date.

3. If the external sources only had matching dates:

- If an inpatient death date is present, use the inpatient death date; otherwise
- Use the external date.

4. If the internal sources only had matching dates use the internal source.

5. If an external source matches an internal source:

- Use the inpatient death date if the external source matches the inpatient death date; otherwise

6. If BIRLS date is present, use the BIRLS date; otherwise

7. If the FEE date is present, use the FEE date.

Appendix B

Best Date of Birth for VHA Vital Status File

1. If all sources had a different date:

- If a complete **Utilization** birth date present, use the Utilization date (highest scoring Utilization birth date); otherwise
- If **Medicare** birth date present, use the Medicare date; otherwise
- If **SSA** birth date present, use the SSA date; otherwise
- If **Enrollment** birth date present, use the Enrollment Date
- If **BIRLS** birth date present, use the BIRLS date; otherwise
- If **VBA (C&P Mini)** birth date present, use the VBA date; otherwise
- Use incomplete Utilization birth date.

2. If all sources have a date and the external dates (SSA and Medicare) matched and the internal dates (Utilization, BIRLS, VBS and Enrollment) matched but the external dates did not match the internal dates, use the internal birth date.

3. If the external sources only had matching dates:

- If a complete Utilization birth date present, use the Utilization date; otherwise use the external date.

4. If the internal sources only had matching dates use the internal date.

5. If an external source matches an internal source:

- Use the Utilization birth date if the external source date matches the Utilization date; otherwise

6. If BIRLS birth date present, use the BIRLS date; otherwise

7. If VBA (C&P Mini) birth date present, use the VBA date; otherwise

8. Use incomplete Utilization birth date.

