

2009-2010 VIReC Database and Methods Cyber Seminar Series



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Improving Mortality Ascertainment Using the VA Vital Status File

Session 12
April 5, 2010

Presented by:
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Session Objectives

- At the conclusion of the program participants should be able to:



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 - Describe limitations of using the VA Vital Status File to ascertain mortality.
- **Out of scope**
 - Cause of death



Session Topics

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



Audience Poll 1

■ Have you ever used the VA VSF?

- 1 Yes, including the Master File
- 2 Yes, Only the Mini File
- 3 No



Audience Poll 2

- **How would you rate your overall knowledge of VA 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}
- 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: April 2008
 - Next update: December 2009
- 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
 - 2008 deaths due to be released in March 2010
- 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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VA VSF Background

- **Impetus for development of VA 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/VitalStatus.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 million SSNs)
 - 9 million SSNs with one record
 - 6 million SSNs with multiple records
 - 2 million non-veteran SSNs
- 110 variables
- Sequence:
 - SCRSSN, descending score, DOB, sex



VSF – Three Files

■ Mini

- One record per SSN
- Combined data
- Over 13 million records
- 16 variables
- Sequence: SCRSSN

■ SSN Conversion

- Scrambled to Real



Example Study Using VSF

- **Mortality 3 years post-diagnosis in veterans diagnosed with ALS by age at diagnosis**
 - Diagnosed in 2002-2003
 - Aged 30 or older
- **Identify 2,000 veterans**
 - VHA inpatient and outpatient files
 - Medicare files
- **VA VSF Mini File**
 - Match on SSN



Example Study Using VSF

■ Results

- Find all 2,000 SSNs
- 1,600 deaths

■ Matched result demographics

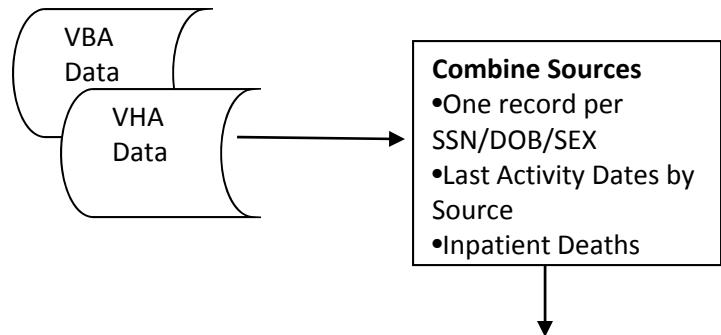
■ Issues found

- 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



Construction of the VA VSF





Merge on SSN/DOB/SEX

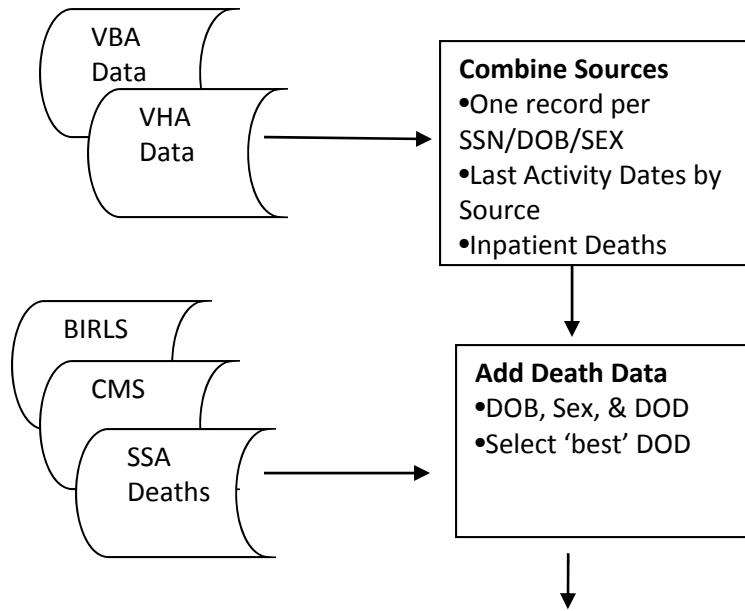


Construction of the Master File

■ 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 Mini File (CPM)
- Date of last utilization or activity
- Inpatient death dates (PTF and FEE)





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
- 'Best' may or may not equal the actual value of the demographic for the owner of the SSN



Construction of the Master File

■ Add Death Data

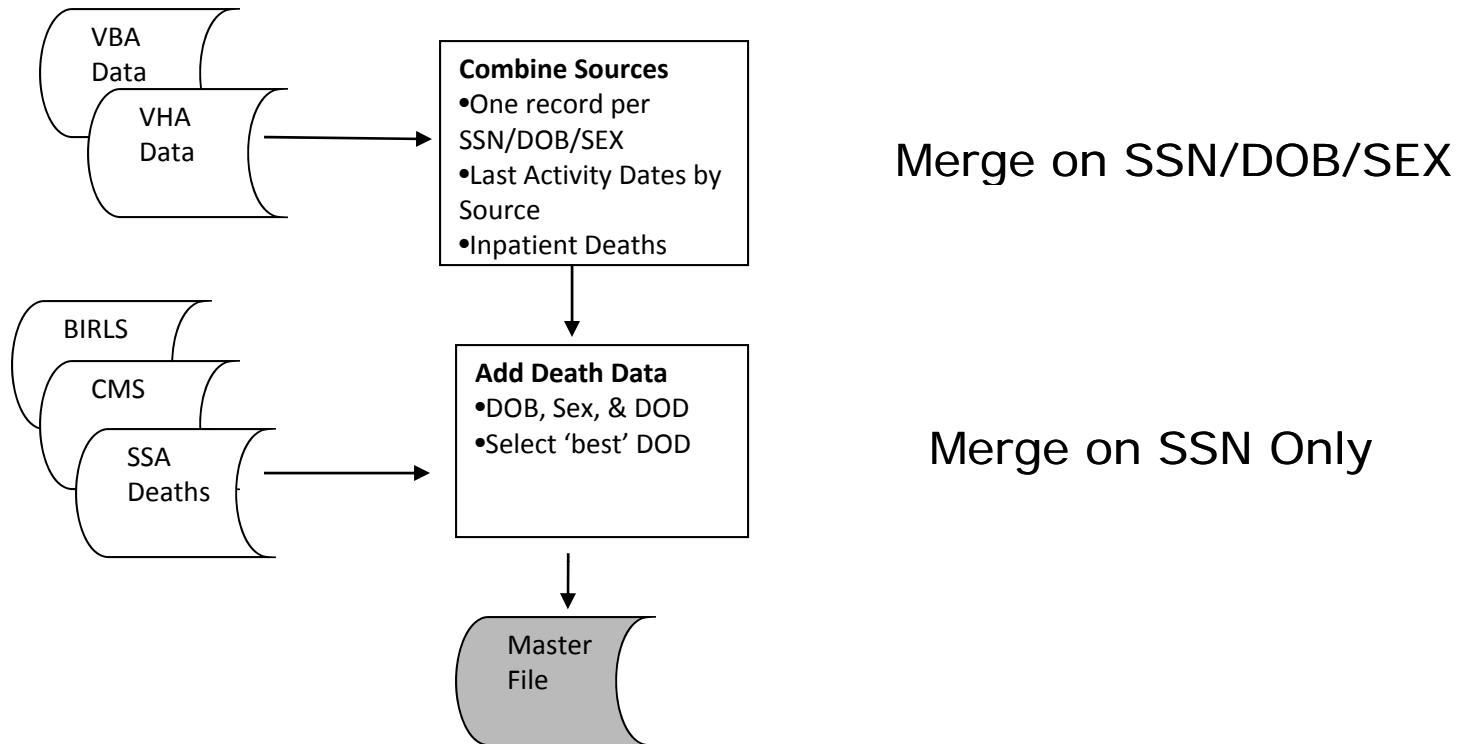
- CMS Medicare data
 - Date of last utilization
 - Race
 - Submission flag by year (CMS_INDYY)
- SSA Death File
 - Does not contain Sex
- BIRLS Death File
- Matched to VA data on **SSN only**
- Demographics (DOB and Sex) and DOD



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 (Inpatient, Medicare, SSA, BIRLS)
 - Put in DOD variable on the Master File record





Contents of the Master File

- **One record for each VA SSN/DOB/SEX combination**
 - All VA sources 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
- **Medicare**
 - Race
 - Submission flag by year (CMS_INDYY)



Contents of the Master File

■ Last activity dates

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

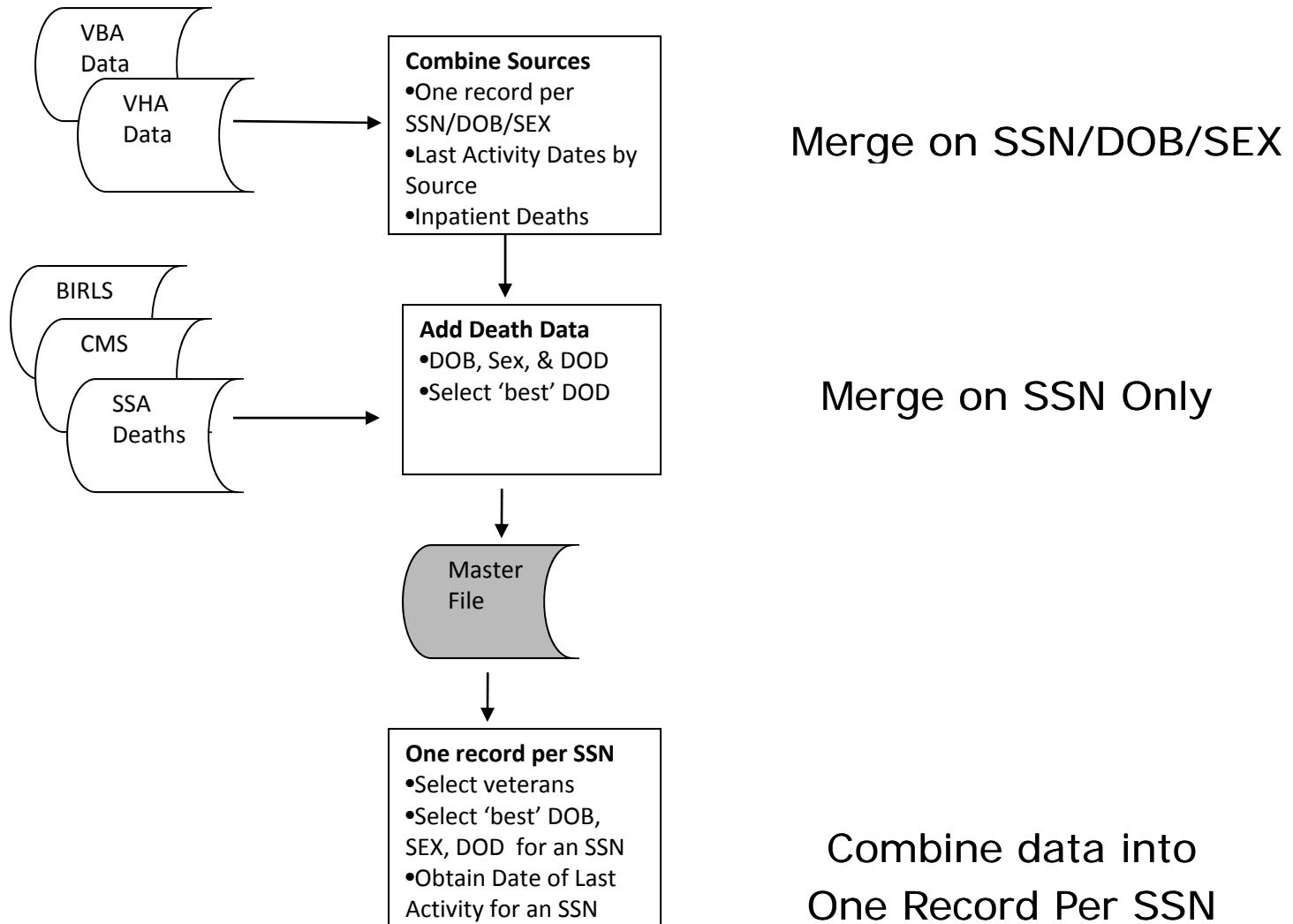
■ Veteran Flags

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

■ Date indicators

- Quality of the date





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

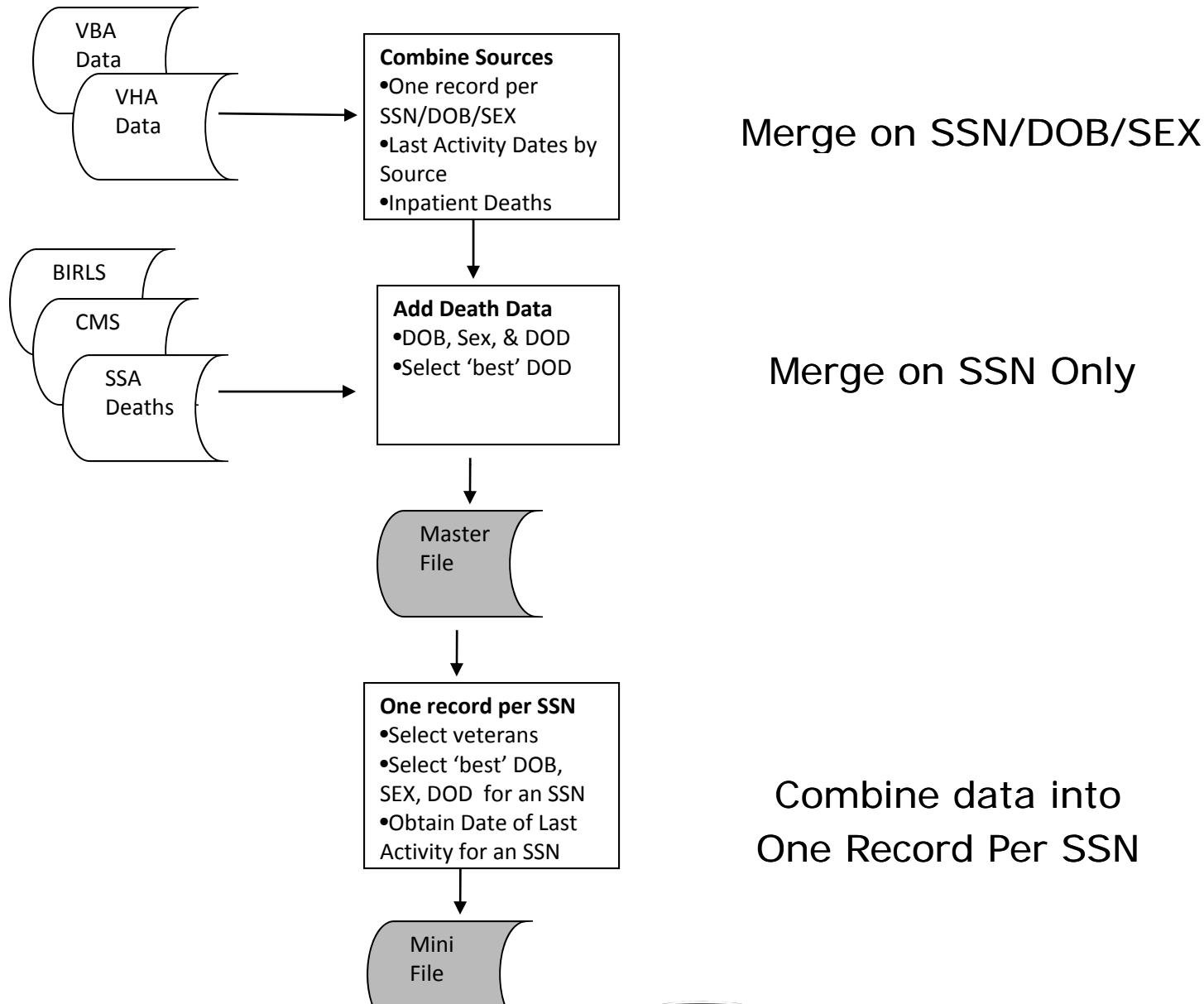
- **Scenario 2: Multiple records for an SSN on the Master File**
 - Select 'best' Sex for each SSN among the SSN/DOB/Sex combinations
 - Similar to selection of best DOB
 - Select 'best' date of death among the SSN/DOB/Sex combinations
 - Select inpatient DOD if present (PTF or FEE)
 - See Appendix A 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





Contents of the VA 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 VA VSF Mini File

■ DOB Source

- VSF Mini created 1/25/2010

Source	Number	Percent
Encounter	7,275,084	54.8%
Inpatient (PTF)	3,464,380	26.1%
Medicare Vital Status	1,100,517	8.3%
Enrollment	1,017,639	7.7%
C&P Mini File	266,461	2.0%
SSA Death Master	90,338	0.7%
DSS Pharmacy	26,608	0.2%
Fee Basis	21,883	0.2%
BIRLS Death File	3,089	0.0%
Total Records	13,265,999	100.0%



Contents of the VA VSF Mini File

■ DOD Source

- VSF Mini created 1/25/2010

Source	Number	Percent
Medicare Vital Status	1,964,940	50.7%
SSA Death Master	1,081,569	27.9%
Patient Treatment File	619,555	16.0%
Birls Death File	152,812	3.9%
Fee Basis	57,512	1.5%
Total Deaths	3,876,388	100.0%



Back to the Example

■ Results

- Find all 2,000 SSNs
- 1,600 deaths

■ Matched result demographics

■ Issues found

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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

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

Mini File Record

Death data added on
SSN only

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	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

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

Mini File Record

Death data added on
SSN only

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	F	8/30/1980	F	5/9/2009	5/31/1968	11/18/2005	5/31/1968	M	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 VSF demographics and your cohort demographics
- To resolve these inconsistencies the Master file will be useful
- VA VSF should not be used for business operations regarding individual veterans



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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

- 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



VA Studies that Used the VA VSF

- **Six studies have used the VA VSF to ascertain death**
 - Four studies used only the VA VSF
 - 2 used additional sources
 - Chart abstraction for in hospital deaths
 - Hospital discharge disposition of death
 - Medicare Vital Status File for non-veteran control group



VA Studies that Used the VA VSF

- **Fihn SD, Vaughan-Sarrazin M, Lowy E et al. Declining mortality following acute myocardial infarction in the Department of Veterans Affairs Health Care System. *BMC Cardiovasc Disord* 2009;9:44.**
 - Is mortality from acute myocardial infarction declining in the VHA?
 - Two analyses
 - Annual mortality in VHA following AMI (10/2004-2006)
 - Compared mortality rates for treatment of AMI in VHA hospitals versus hospitals funded by Medicare
 - Data sources
 - External Peer Review Program
 - Quality monitoring and improvement program that includes AMI
 - VA Inpatient Files (PTF)
 - Medicare Inpatient File (MEDPAR)
 - Mortality outcomes
 - In-hospital, 30-day, 90-day, and one year



VA Study that Used the VA VSF

- **Fihn SD, Vaughan-Sarrazin M, Lowy E et al. (cont.)**

- Mortality Ascertainment
 - Hospital discharge disposition
 - VA Vital Status File
 - Medicare Enrollment Files
- Patients
 - 65 or older
- Results
 - Mortality in VHA declining
 - Adjusted 30-day declined from 16.3% in 2004 to 13.9% in 2006
 - Statistically significant declines of 15% in 30-day and 10% in one year
 - Decline in mortality parallels decline in Medicare-funded hospitals
 - Unadjusted 30-day mortality fell to 15.7% from 16.0% in VHA hospitals
 - Unadjusted 30-day mortality fell to 15.5% from 16.7% in Medicare hospitals
 - Adjusted odds ratios for death were not significantly different for VHA and Medicare hospitals (1.02, 95% CI 0.96-1.08)



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Future Enhancements

- VIReC Data Quality Study
- Medicaid Data
 - Available now
 - Under 65 deaths
- VETSNET
 - Replacement for C&P Mini



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Help

■ National Data Systems

- Laureen Kennedy
- Larry Hughes
- <http://vaww4.va.gov/NDS/DataAccess/VitalStatus.asp>

■ VIReC 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

■ May 3, 2010

- Assessing VA Health Care Use: Inpatient
- Denise M. Hynes, PhD, 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, Rosenwaike 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 VA 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 VA 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.

