CHEST Online Supplement

Increased Risk of Pulmonary Embolism Among US Decedents With Sarcoidosis From 1988 to 2007

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e-Appendix 1.

Methods

The database. The NCHS annually compiles data from all death certificates in the U.S. and releases the figures in yearly public-use files—each containing over two million records (one for each decedent). A record contains decedent demographics, multiple cause-of-death (MCOD) codes (which identify up to 20 conditions related to death), and the ultimate underlying cause-of-death (UCD).(1) For this study, we analyzed files from 1988-2007. From 1988 to 1998, we captured all decedents with sarcoidosis ICD-9 code 135. Because of the change in coding from ICD-9 to -10, from 1999 to 2007, we captured all decedents with sarcoidosis ICD-10 code D86 (including D86.0-D86.9). Data from more recent years have yet to be compiled by the NCHS. A substantial lack of state reporting race/ethnicity data for 1988 precluded our analysis of race/ethnicity-specific mortality for that year, so for certain analyses, the earliest year available was 1989.

From 1988-1998, the NCHS coded conditions related to death with the Ninth Revision of the International Classification of Diseases (ICD-9),(2) but, in 1998, it stopped coding with the ICD-9 and began using the Tenth Revision of the ICD (ICD-10).(3) For each record, the NCHS codes MCOD data in two axes: 1) the entity axis, and 2) the record axis. The entity axis contains the cause(s)-of-death as listed by the death certifier and maintains

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the order as written on the death certificate. The NCHS derives the record axis code by applying a computerized algorithm called Translation of Axis (TRANSAX) to the entity axis code. Applying this algorithm minimizes repetition and inconsistencies within the entity axis data to produce the more standardized record axis. We used the record axis code for this study which ultimately includes up to 20 associated causes of death, including the underlying cause of death (see below). National MCOD data quality is maintained by records review at the state and national level.

The NCHS uses another computerized system, called the Automated Classification of Medical Entities (ACME), to code the UCD by applying ICD modification rules to the record axis codes generated by TRANSAX.(4) The World Health Organization (WHO) defines the UCD as "the disease or injury which initiated the train of events leading directly to death, or the circumstances of the accident or violence which produced the fatal injury,"(3, 5) and that is the definition we employed here.

The UCD. From 1988 to 1998, UCD diagnostic codes examined included: ischemic heart disease (ICD-9 codes 410 through 414.9 and 429.2), heart failure (ICD-9 codes 428 through 428.9), cardiomyopathy (ICD-9 codes 402.9 and 425); cardiac dysrhythmia/sudden cardiac death (ICD-9 codes 427); pulmonary hypertension (ICD-9 codes 416.0, 416.8 and 428.9); pneumonia (ICD-9 codes 480 through 487.8); cerebrovascular disease (ICD-9 codes 430 through 438), and neoplasms (lung: ICD-9 codes 162-162.9; stomach: ICD-9 codes 151-151.9; colon: ICD-9 codes 153-153.9; pancreas: ICD-9 code 157.9; liver: ICD-9 codes 155-155.2; prostate: ICD-9 code 185; bladder: ICD-9 codes 188-188.9; brain: ICD-9 codes191-191.9; kidney: ICD-9 codes 189-189.9; uterus: ICD-9 codes 179, 182.1, 182.8; cervix: ICD-9 codes 180-180.9; ovary: ICD-9 codes 183-183.9; breast: ICD-9 codes 174-174.9).

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After 1998, diagnostic codes included the following: ischemic heart disease (ICD-10 codes I20 through I25), heart failure ICD-10 codes I50 through I50.), cardiomyopathy (ICD-9 codes 402.9 and 425); cardiac dysrhythmia/sudden

cardiac death (ICD-10 codes I46-I49); pulmonary hypertension (ICD-10 codes I27.0 and I27.2); pneumonia (ICD-10 code J09 through J18.9); cerebrovascular disease (ICD-10 codes I60 through I69.8); and neoplasms (lung: ICD-10 codes C34-C34.9; stomach: ICD-10 codes C16-C16.9; colon: ICD-10 codes C18-C18.9; pancreas: ICD-10 codes C25-C25.9; liver: ICD-10 codes C22-C22.9; prostate: ICD-10 codes C62-C62.9; bladder: ICD-10 codes C67-C67.9; brain: ICD-10 codes C71-C71.9; kidney: C64-C66; uterus: ICD-10 codes C54-C54.9; cervix: ICD-10 codes C53-C53.9; ovary: ICD-10 C56, C57-C57.9; breast: ICD-10 codes C50-C50.9).

References

1. Centers for Disease Control and Prevention (CDC) NCfHS. Public use data tape documentation. Multiple cause of death for icd-9 1992 data. Hyattsville, Maryland: U.S. Department of Health and Human Services; 1994.
2. Service USPH. International classification of diseases, ninth revision. . Washington, DC: U.S. Government Printing Office; 1980. p. (PHS) 80-1260.
3. (WHO) WHO. Icd-10: International statistical classification of diseases and related health problems: Tenth revision. Geneva; 2003.
4. Isreal R. Automation of mortality data coding and processing in the united states of america. *World Health Stat Q* 1990;43:259-262.
5. Redelings M, Sorvillo F, Simon P. A comparison of underlying cause and multiple causes of death. *Epidemiology* 2006:100-103.