

Women's All Causes Death and Alzheimer's Disease: An Editorial

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Abstract

Recently, Dutch people were told by their newspapers, they die now from completely different causes, then 5 years ago. For Dutch women the dementia syndrome, including Alzheimer's disease, is now the number one cause of death since 2013. This shift in death causes is raised by the introduction of the IRIS automated coding system of death certificates, implementing the ICD-10 codes, as released by the WHO in 1993. The IRIS coding system has a preference for neurodegenerative diseases above infectious diseases. The IRIS coding system is discussed, its consequences for interpreting death statistics and prevalence rates of eg Alzheimer's disease based on death certificates. The unexplained differences in U.S-Dutch death statistics, using the same IRIS coding system are considered. The inter and intra-coder variability is discussed, as well as up-coming new machine-learning techniques and rule based methods for automated death certificate coding.

Introduction

The number of Alzheimer's deaths on death certificates have been found to be underreported. [1-3]. Reports of overestimation of Alzheimer's as a primary death cause, which would be in line with the "real world", are absent in a PubMed/Medline search. This is remarkable as timely diagnosis of Alzheimer's is not infrequent [4].

As Alzheimer's cannot be the primary cause of death only, cardiovascular deaths, respiratory diseases and sepsis were filled in as a primary death cause [5]. Studies concerning the possible reluctance of doctors to change this policy are not available. Death certificates were coded manually for over 100 years (1901-2012) in the Netherlands. In 2013 the automated coding system was introduced, using the free IRIS software program for the implementation of the ICD-10 coding system, as released by the WHO in 1993 [6,7]. The introduction of automated coding systems causes major shifts in the frequency of occurrence of cause of death in death statistics. The IRIS-coding system has a preference for neurodegenerative diseases above infectious diseases, in accordance with an international (political) consensus and should be accepted for the sake of international comparability of data.

Changing to the automated coding system resulted in the Netherlands in a strong shift of death causes as the dementia syndrome (+23%) and multiple sclerosis (+35%). Since 2013 the dementia syndrome is death cause number 1 in women in the Netherlands, with an increasing trend until now. In the ICD-10 classification the dementia syndrome includes vascular dementia (F01), dementia nao (F03), neurocognitive disorder (F06), Alzheimer's disease (G30), FTD and Lewy-Body disease (G31). These types increased with the IRIS-coding system with 25%, 16%, 1133%, 30% and 472%, respectively. In the automated coding system, a causal relationship between dementia, pneumonia, urinary tract infections (UTIs), and falls is presumed. The same effect was seen in cerebrovascular accident (CVA) as a death cause (+11%). Not surprisingly, pneumonia and UTIs were less causes of death (both -36%). The steep increase of risk factors as hypertension (+32%), obesity (+70%), use of alcohol (+113%) and hypercholesterolemia (+488%) probably reflects the American origin of the software. Smoking is not a risk factor by international convention.

The IRIS automated coding system is used in Canada, the U.S., Australia and in half of the EU countries. Poland, Portugal and Spain do not use it, for example [8,9]. The latest CDC figures for all women death causes are from 2014. Heart disease is still number 1 (22,3%), while Alzheimer's disease is the number 5 cause of death (5%) [10]. Peter Harteloh, Institute of Statistics, the Netherlands, performed a so called "bridge study", comparing both automated and manual coding in the same sample. Of the double coded death certificates (n=86.900), 75% showed exactly the same underlying cause of death (ICD-10, four digits). On the three-digit level of the ICD-10 code, the overall agreement between manual and automated coding was 84% and on ICD-10-chapter level the agreement was 89%. Agreement differed by ICD-10 chapter. Compared to manual coding IRIS selected significant more infectious diseases (47%), endocrine disorders (16%), mental disorders (32%), and disease of the nervous system (18%) as underlying cause of death. IRIS selected significant less diseases of the respiratory system (22%), the digestive system (15%), the skin (30%) the genitourinary tract (22%), and symptoms and signs (10%) as underlying cause of death. Users of death statistics should be aware, that automated coding causes large changes in death statistics, when studying trends in time or regional variations in causes of death [11].

Are there great differences between international coders of the IRIS system? Antini *et al.* evaluated the agreement of nosologic coding between a Chilean coder and a U.S. instructor coder. (n=1725). Levels of intercoder agreement for the total causes of death coded by at least one of the coders at the four- character, three- character and chapter level was 76,4%, 81,7% and 86% [12]. These results seem therefore adequate, and cannot explain the large differences in U.S. and Dutch all cause women's deaths. The biggest health problems in the U.S. are now the obesity and opioids epidemics. May be they are responsible for the observed

differences in death statistics between the two countries. Prevalence values of Alzheimer's disease based on death statistics can differ enormously in this way. Further research is required therefore, as it will reveal also the already present decline in Alzheimer's incidence, due to lifestyle interventions and better treatment of cardiovascular diseases as hypertension, stroke and diabetes [13]. New machine learning and rule based methods for automated classification of free-text death certificates are tested already [14].

Conclusion

The introduction of the automated IRIS coding system for death certificates in 2013 in the Netherlands caused dramatic shifts in death causes. The dementia syndrome is now the number one cause of death for Dutch women. The system was developed for the sake of international comparability. Although the system proved its efficacy, accuracy and reliability, it is used only partly in the Western world. Unexplained differences in death statistics between IRIS coding users as the U.S. and the Netherlands have not led to the expected research response, which is rather disappointing. Users of automated death statistics should be aware of the large changes these systems are introducing, when studying trends in time or regional variations in causes of death. Prevalence rates of diseases as Alzheimer's disease, based on automated coding of death certificates can vary enormously, compared to manual coding. New up-coming machine-learning and rule based methods are already tested, while the clinical relevance and clinical outcome of the IRIS coding system is not clear yet.

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