Suffocation Deaths among the Elderly

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Abstract

Suffocation is the third leading (unintentional) injury-related cause of death among older persons. Among persons 85 years of age and older, there are more deaths attributed to suffocation as an underlying cause than to motor vehicle traffic accidents. Many more deaths among this age group list suffocation as a contributing cause of death. Suffocation as a cause of death is poorly understood and often overlooked in research on old age mortality. In this paper, we examine the sex and age patterns of suffocation deaths and analyze the multiple causes of death associated with suffocation. Suffocation death rates are higher among men than women, and a larger proportion of these deaths occur in hospitals and nursing homes compared with deaths from all causes. Suffocation as a contributing cause of death is associated with chronic conditions such as Parkinson's, Alzheimer's disease, and stroke. We discuss these findings and their implications for medical care and for mortality research.

NOTE: All estimates will be updated with 2006 data for final paper.

Introduction

In 2004, 3,369 deaths among persons age 65 and older were attributed to suffocation (ICD-10 codes of W75 to W84). The rate of deaths (9.3 per 100,000 deaths) was the third highest among unintentional injury deaths, following falls (41.1 per 100,000) and motor vehicle accidents (19.8). Among the oldest old (persons 85 and over), suffocation is the second leading cause of unintentional injury deaths. Many more death certificates list suffocation as an associated (17, 058 among persons 65 and over in 2004). Suffocation deaths are well-studied in infant mortality, but rarely examined in cause-of-death studies for adults. We use the Vital Statistics Multiple Cause of Death files to study this topic (Centers for Disease Control and Prevention 2007). While the number of deaths is only a small proportion of overall deaths among older persons (1,755,669 in 2004), the phenomenon of unintentional suffocation deaths is an interesting and overlooked issue in injury and old age mortality

Results

Figure 1 shows the underlying (UCOD) and multiple cause of death (MCOD) rates by age and sex in 2004. Rates of suffocation deaths are low during the adult years and highest in infancy and old age. The multiple cause of death rates are higher among persons 75 years and older than among infants, and the underlying cause of death rates

are highest among persons 85 and older. At every age, rates are higher among males than females.

Deaths among older persons where suffocation is mentioned on the death certificate are more likely to occur in hospitals or long term care settings compared with deaths from all causes. Table 1 shows the percent distribution of place of death among decedents age 65 and older. While 23 percent of all deaths to older people occurred at home, only 8 percent of deaths where suffocation was mentioned on the death certificate happened at home. Close to 50 percent of suffocation deaths occurred in the hospital compared with 37 percent of deaths from all causes.

We examine the causes of death associated with suffocation, by extracting the cases where suffocation is mentioned as either an underlying or an associated cause. We focus on the leading causes of death among older persons and on any other causes that were frequently mentioned along with suffocation. We describe the connection between suffocation and other causes by a strength of association measure shown in Table 2. The measure is the ratio of observed deaths with both causes to the expected number of deaths with the same causes, assuming the causes were independent. The expected number of deaths is calculated as:

$$\frac{\text{(Number of Deaths with Suffocation)} * \text{(Number of Deaths with Selected Cause)}}{\text{Total Number of Deaths from all Causes}}$$

The strength of association of suffocation with all causes of death is equal to one. The strength of association for the selected causes with suffocation shown in Table 2 ranges from 0.3 (cancer) to 3.2 (Parkinson's disease). (Gorina and Lentzner, 2008)

Discussion

The high rates of suffocation deaths among the elderly and the association of suffocation with other causes of death is not well-known in either the injury mortality literature or in cause-of-death research. Our results to date are primarily descriptive since definitive conclusions about the nature of the links among causes are difficult to draw using only the cause of death files without additional medical care information.

One puzzling feature of the cause of death codes for suffocation is that the overwhelming majority of the deaths are coded as W80, defined as "inhalation and ingestion of other objects causing obstruction of respiratory tract." Codes W78 (inhalation of gastric contents) and W79 (inhalation and ingestion of food causing obstruction of respiratory tract) are much less likely to be used. We are consulting with experts in the Mortality Statistics Branch as to whether these causes of death appear to be coded correctly.

The association of suffocation deaths with Alzheimer's, stroke, and Parkinson's disease suggests a link to dysphagia, difficulty swallowing, which is more prevalent among persons with these diseases than among the older population in general (Marik and Kaplan 2003; Ney et al. 2009). However, the actual mechanism or chain of events leading to suffocation as a contributing cause cannot be discerned only from death certificate data. Persons with dysphagia may be more likely to have feeding tubes. Feeding tubes are one treatment for dysphagia that is intended to circumvent problems of eating and swallowing, but they have their own additional risks of mortality and

morbidity (Ney et al. 2009). The higher proportion of suffocation deaths in hospitals offers a hint that medical interventions may be playing a role, but the direction of any causality between suffocation deaths and hospitalization is not clear. One possibility is that these decedents are simply more likely to be hospitalized before death because of the severity and complexity of their condition, leading to more of these deaths to occur in hospitals. Another possibility is that the medical interventions in hospitals themselves could be a contributing factor to suffocation at the end of life. More research with other data sources is needed to address this question.

In this paper, we highlight a little-known phenomenon in mortality research, the high rates of suffocation deaths among older people. We provide descriptive statistics on this phenomenon and discuss possible causes. We hope to draw attention to this issue and to stimulate more research on this topic in mortality studies.

References

Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death File 1999-2004. CDC WONDER; On-line Database, compiled from Multiple Cause of Death File 1999-2004 Series 20 No. 2J, 2007. Accessed at http://wonder.cdc.gov/mcd-icd10html. on Sep 17, 2009 9:17:44 AM.

Gorina Y. and Lentzer H. "Multiple causes of death in old age." Aging Trends, No. 9. Hyattsville, MD. National Center for Health Statistics. 2008.

Marik PE and Kaplan D. "Aspiration Pneumonia and Dysphagia in the Elderly." Chest. 124: 328-336. 2003

Ney DM, Weiss JM, Kind AJH, and Robbins J. "Senescent Swallowing: Impact, Strategies, and Interventions. Nutrition in Clinical Practice. 24: 395-413. 2009.

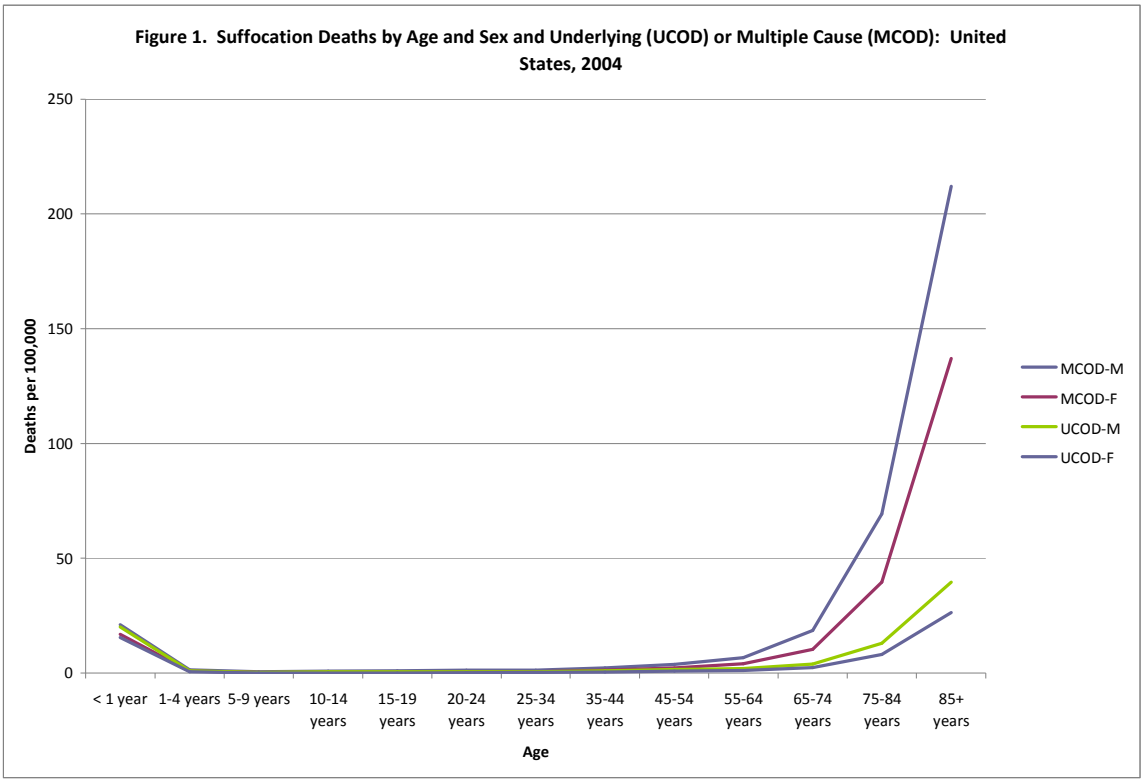

Table 1. Percent Distribution of Place of Death among Decedents age 65 and older: United States, 2004

Place of Death	All Causes	Suffocation (Underlying Cause)	Suffocation (Multiple Cause)
Hospital Inpatient	37.2	52.2	48.5
Hospital Outpatient/ER	5.4	11.7	6.0
Hospital - DOA	0.6	1.4	0.6
Home	22.8	8.1	8.0
Hospice Facility	0.5	0.1	0.2
Nursing Home/LTC Facility	28.3	23.7	33.9
Other	5.0	2.6	2.6
Unknown	0.3	0.3	0.3
Number of Deaths	1,755,669	3,369	17,058

Table 2. Associations between suffocation and other selected causes of death among decedents age 65 and over: United States, 2004

Cause of Death (ICD Code)	Association	No. of Deaths w/ suffocation & selected cause
Parkinson's Disease (G20-G21)	3.18	1,024
Unspecified Dementia (F03)	2.41	3,412
Flu and Pneumonia (J10-J18)	1.83	3,125
Alzheimer's (G30)	1.80	1,752
Stroke (I60-I69)	1.75	3,731
Septicemia (A40-A41)	1.07	1,127
Diabetes (E10-E14)	0.86	1,455
Chronic Lower Respiratory Disease (J40-J47)	0.83	1,751
Nephritis (etc.) (N00-N07, N17-N19, N25-N27)	0.68	1,153
Heart Disease (I00-I09, I11, I13, I20-I51)	0.65	5,715
Cancer (C00-C97)	0.31	1,316