Supplementary Online Content

Woolf SH, Chapman DA, Sabo RT, Weinberger DM, Hill L. Excess deaths from COVID-19 and other causes, March-April 2020. JAMA. Published online July 1, 2020. doi:10.1001/jama.2020.11787

eTable. Grouped cause data reported by Centers for Disease Control and Prevention

This supplementary material has been provided by the authors to give readers additional information about their work.

Causes of death: Causes of death examined in this study were limited to those for which provisional death data were available during 2020 and the first weeks of the novel coronavirus disease 2019 (COVID-19). The Centers for Disease Control and Prevention provided data for 12 grouped causes (eTable).[1,2] Deaths from external causes were calculated as total all-cause deaths minus deaths from natural causes.

eTable. Grouped cause data reported by Centers for Disease Control and Prevention	
Causes of death	**Definitions**
Natural causes[3]	Deaths from medical causes, not resulting from external causes (e.g., accident, suicide, homicide) or from causes pending or not determined
External causes	Deaths from accidents, suicide, homicide, and causes pending or not determined
	***International Classification of Disease 10* (ICD-10) codes**
Septicemia	A40-A41
Malignant neoplasms	C00-C97
Diabetes mellitus*	E10-E14
Alzheimer's disease*	G30
Diseases of the heart*	I00-I09,I11,I13,I20-I51
Cerebrovascular diseases*	I60-I69
Influenza and pneumonia	J10-J18
Chronic lower respiratory diseases	J40-J47
Other diseases of the respiratory system	J00-J06,J30-J39,J67,J70-J98
Nephritis, nephrotic syndrome, and nephrosis	N00-N07,N17-N19,N25-N27
Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	R00-R99
COVID-19*	U07.1
* Results reported in Research Letter. Results for all 14 causes available upon request.	

Modeling: A hierarchical Poisson regression model was fitted to weekly death data from January 2014 through February 2020. All model terms (intercept and slopes) were fit hierarchically, with an overall fixed effect for each parameter and a random effect that allowed each parameter to vary by state. The Bayesian Information Criterion (BIC) was compared for 30 alternative sets of covariates that adjusted for time using calendar year (January-December), epidemiological year (July-June), or a linear trend and compared different combinations of harmonics with varying periodicities (4, 6, 12, and 24 months). The 5 models with the lowest BIC produced excess death estimates ranging from 73,524 to 88,991 (mean = 85,217; median = 88,189). The best-fitting model (lowest BIC)—which used calendar year and periods of 6, 12, and 24 months—estimated 87,001 excess deaths and was selected for this study. Details available on request.

REFERENCES

[1] Weekly counts of deaths by state and select causes, 2014-2018. National Center for Health Statistics website. Updated June 5, 2020. Accessed June 10, 2020. https://data.cdc.gov/NCHS/Weekly-Counts-of-Deaths-by-State-and-Select-Causes/3yf8-kanr

[2] Weekly counts of deaths by state and select causes, 2019-2020. National Center for Health Statistics website. Updated June 10, 2020. Accessed June 10, 2020. https://data.cdc.gov/NCHS/Weekly-Counts-of-Deaths-by-State-and-Select-Causes/muzy-jte6

[3] National Center for Health Statistics. *Physicians' Handbook on Medical Certification of Death*. Publication No. (PHS) 2003-1108. Washington, DC: US Department of Health and Human Services, 2003.