

Measuring Pandemic Impact: Vital Signs From Vital Statistics

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic continues to evolve, causing the loss of at least 890 000 infected persons globally and 175 000 in the United States in the first 8 months since its recognition. As Kiang and colleagues (1) emphasize in their article, the deaths directly related to infection tell only part of the story. Many deaths are likely to be attributable to indirect consequences of the pandemic, including those associated with disruptions in health care systems that delay indicated screening tests and immunizations, impede monitoring and treatment of chronic conditions, and discourage proper maternal and perinatal care (1, 2). In addition, the economic and social hardships endured by many persons—especially those in the most vulnerable communities—further complicate access to appropriate medical and mental health care and are likely adding to the pandemic's toll.

Reliable and timely information about both direct and indirect mortality attributable to this pandemic is essential (3). In the United States, the most accurate data to assess mortality from any cause are derived from the National Vital Statistics System (NVSS). This decentralized collaborative system includes 50 states, 2 cities, and 5 territorial jurisdictions that hold the legal authority to register vital events, including births, deaths, and fetal deaths (4). At the federal level, the National Center for Health Statistics (NCHS) at the Centers for Disease Control and Prevention is authorized to obtain vital statistics reports from these jurisdictions. Although there is no mandate for reporting, the NCHS coordinates and partially funds the acquisition and processing of the federal data through the Vital Statistics Cooperative Program. The NVSS has sustained an ambitious modernization agenda over the past several years and has made significant progress in improving the accuracy of the national death certificate data disseminated by NCHS. However, achieving timely reporting remains a challenge—one that has attained national urgency in the context of the current pandemic, when near-real-time mortality data are in high demand for monitoring patterns of transmission, measuring direct mortality, estimating excess deaths, and assessing the effect of mitigation efforts (1-4).

The complexity of death certificate completion at the local level creates one major barrier to timely mortality reporting (3-6). Funeral directors are facile at using the Electronic Death Registration System to complete the required demographic information about the deceased but must rely on the physician to certify the cause of death (4, 6). Unfortunately, many physicians are not well trained to complete this task, and error rates are notoriously high. This problem is exacerbated by the declining number of nosologists with expertise in coding the cause of death. Reporting delays are also common in cases where a coroner or medical examiner is required to determine the cause of death. In addition

to the shortage of forensic pathologists that is reaching crisis proportions across the country, constrained budgets make it difficult for them to obtain the special tests that may be needed to confirm or exclude a diagnosis, which can delay completion of the final death certificate. These issues are exacerbated in the context of the current pandemic, especially when SARS-CoV-2 testing is not readily available (3).

The provisional or final death certificate is forwarded to the vital registry in the legally accountable state, city, or territorial jurisdiction, where it undergoes additional review and processing before data are forwarded to the NCHS. In response to the recognition that death certificates were fraught with inaccuracies and inconsistencies across jurisdictions, the NCHS assumed responsibility for coding the cause of death included in the national data sets beginning in 2011 (4). Computerized algorithms are used for the initial processing, but for the approximately 20% of outlier reports, manual review and correction is required, a process that usually takes about 7 days (7). This labor-intensive process is key to maximizing the accuracy of the national death statistics but comes at the price of considerable time and expense. In recent years, NCHS has made provisional data and special reports available to improve access to information before data sets are finalized and locked (4, 7, 8). These resources are helpful in assessing the effect and mortality trends of important public health challenges like opioid addiction and SARS-CoV-2, but they are subject to change as reports are filed and corrected. Reporting lags are still problematic because states report at variable rates, and most deaths due to complex conditions like coronavirus disease 2019 (COVID-19) have to be manually coded to ensure accuracy (7, 8).

Another major barrier to accurate and timely mortality reporting is inadequate funding at every level in the system. Health care organizations lack resources to support autopsies, train students and clinicians, or hire nosologists to ascertain and code the cause of death. Salaries for forensic pathologists are not commensurate with those of peers, and medical examiners are in short supply (9). At the state level, vital registry budgets are underfunded, and the fees generated from certificate filings are rarely used to enhance system modernization and often end up in the general fund or are targeted for other priorities (4). The Social Security Administration does make important contributions to support the NVSS, but insurers and others who use these data do not contribute to a sustainable revenue stream. Perhaps even more telling is the trajectory of the NCHS budget. Beginning in the 1990s, severe budget constraints have forced the elimination of components of the federal vital statistics data set, necessitated the elimination of specific data elements, slowed implementation of modernization opportunities, and created financial uncertainty in the funded jurisdictions, espe-

cially when funds were not available to support a full data year (4). Even now, despite the growing demand for timely national data and the increased cost of managing such a complex program, over the past 5 years, the NCHS budget has not increased at all.

The SARS-CoV-2 pandemic has exposed both the enormous value of the NVSS and the need to improve its utility in detecting and monitoring the mortality burden of emerging health threats and disasters. Now is the time to accelerate modernization of this critical national resource. The biggest opportunity is to evolve artificial intelligence algorithms that prepopulate death certificates with existing electronic health record data and provide decision support to the physicians responsible for determining the cause of death (4). This step alone is likely to improve the accuracy of death certificates and reduce the delays in completing, checking, correcting, and submitting the core data. States must also enhance the jurisdictional investments available to support modernization of local vital registry systems. Existing revenue streams from filing and processing certificates could be augmented and directed to this effort, and new revenue streams from those who use vital statistics data should be explored. The Social Security Administration already invests, but other agencies, private insurers, and others who depend on access to this information for business support should contribute to the costs of its acquisition and use. Health care organizations and teaching institutions also have a role to play. Physicians and trainees should be required to learn about the importance of death certificates and how to correctly complete them (4, 6). Augmenting the forensic pathology workforce in institutional and governmental settings is a harder challenge with broader implications for medical quality assurance, criminal investigations, and public health, but improving the base salary structure and creating loan forgiveness programs are incentives that can be implemented now (9).

Nationally, the NCHS and NVSS must receive a substantial increase in federal support. The current budget that supports the single most important resource for monitoring our nation's health is miniscule in comparison with our overall investment in health care delivery. New resources are needed for federal enhancements in data systems, data analytic tools, and data access—as well as data scientists. Budget enhancement would allow NCHS to stabilize the vital registry system; incentivize the modernization efforts; and achieve consistency, accuracy, and timeliness across reporting jurisdictions. In addition, near-real-time reporting systems that facili-

tate detection and monitoring of emerging health threats, including pandemics and natural disasters, would become a reality—before the existing gaps are once again thrust into center stage during the next crisis (1–3, 7, 8).

Our national vital statistics are truly vital to our nation's health and emergency preparedness systems. It is time we commit to investing accordingly.

Julie Louise Gerberding, MD, MPH
Merck & Co.
Kenilworth, New Jersey

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Corresponding Author: Julie Louise Gerberding, MD, MPH, Merck & Co., 351 North Sumneytown Pike, North Wales, PA 19454; e-mail, Julie.Gerberding@merck.com.

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