Rapid Expert Consultation on Understanding Causes of Health

Care Worker Deaths Due to the COVID-19 Pandemic

(December 10, 2020)

December 10, 2020

Robert Kadlec, M.D.

Assistant Secretary for Preparedness and Response

200 Independence Avenue, SW

Washington, DC 20201

Dear Dr. Kadlec:

Attached please find a rapid expert consultation on health care worker (HCW) morbidity and

mortality due to COVID-19 that was prepared by Sue Anne Bell, and Matthew Wynia, with

input from John Hick, and conducted under the auspices of the National Academies of Sciences,

Engineering, and Medicine’s Standing Committee on Emerging Infectious Diseases and 21st

Century Health Threats.

This rapid expert consultation describes what we know about the extent of deaths and mental

health impairments among HCWs due to COVID-19. The document stresses the advantages that

could follow from more complete national data on the scope of the problem. Building on such a

data system, focused epidemiological studies can better home in on measures that will protect the

health and well-being of the health care workforce.

A healthy health care workforce is vital to the nation’s response to the COVID-19 pandemic. We

hope the assessment in this rapid expert consultation can help protect the HCWs who care for all

of us.

Sincerely,

Harvey V. Fineberg, M.D., Ph.D.

Chair

Standing Committee on Emerging Infectious Diseases and 21st Century Health Threats

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**INTRODUCTION**

The COVID-19 pandemic has created both acute and chronic stresses on the health care system

and on health care personnel nationwide. At present, the nation lacks a uniform system to collect,

collate, and report illnesses and deaths among HCWs due to COVID-19.

As with COVID-19, past epidemics have severely harmed HCWs. During the first severe acute

respiratory syndrome (SARS) epidemic in 2003, HCWs accounted for 1,707 (21 percent) of

8098 cases globally.1 The 2014–2016 Ebola virus outbreak in West Africa also

disproportionately affected health care professionals. Liberia saw more than 8 percent of its

health care population killed by the disease, compared to 0.11 percent of its general population.

Comparable statistics were also observed in Sierra Leone and Guinea, where 0.06 percent and

0.02 percent of the population infected with Ebola virus disease (EVD) died versus 6.7 percent

and 1.45 percent of HCWs with EVD, respectively.2 Data detailing the disproportionate effects

on HCWs are only now emerging for the COVID-19 pandemic. A report published in *Morbidity*

*and Mortality Weekly Report* on October 30 analyzed 6,760 COVID-19 hospitalizations that

occurred between March 1 and May 31, 2020, and noted that 6 percent of infections were among

health care professionals. The report also found that nearly 28 percent of them had severe

illnesses and were ultimately admitted to an intensive care unit.3

Evidence suggests that COVID-19 infection is more prevalent among HCWs who lack

appropriate personal protective equipment (PPE) or in work settings without a universal mask

mandate. Whether an individual HCW’s infection originated in the workplace or in the

community may be uncertain. As described below, only a few studies report on efforts to

improve the health and well-being of HCWs during the COVID-19 pandemic.

At the request of the U.S. Department of Health and Human Services’ Office of the Assistant

Secretary for Preparedness and Response, this rapid expert consultation reviews current

resources and methods for tracking and evaluating HCW deaths related to COVID-19 in the

health care setting. As outlined in the Statement of Task in Box 1, deaths related to COVID-19

among HCWs include deaths due to occupational exposure directly to COVID-19 and deaths that

could reasonably be attributed to conditions exacerbated by COVID-19, such as HCW suicides

due to fatigue, stress, or burnout. This rapid expert consultation also examines some ways to

support HCW well-being and safety during the pandemic.

1 World Health Organization. 2003. World Health Organization summary of probable SARS cases with onset of

illness from 1 November 2002 to 31 July 2003. http://www.who.int/csr/sars/country/table2003\_09\_23/en/External

Link (accessed December 4, 2020).

2 Evans et al. 2015. Healthcare worker mortality and the legacy of the Ebola epidemic. *The Lancet Global Health*

3(8). https://doi.org/10.1016/S2214-109X(15)00065-0.

3 Kambhampati et al. 2020. COVID-19–associated hospitalizations among health care personnel—COVID-NET, 13

States, March 1–May 31, 2020. *Morbidity and Mortality Weekly Report* 69:1576–1583.

http://dx.doi.org/10.15585/mmwr.mm6943e3.

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This rapid expert consultation adopts the definition of “health care worker” employed by the

U.S. Centers for Disease Control and Prevention (CDC), as outlined in Box 2.

**BOX 1**

**Statement of Task**

As of August 24 *Kaiser Health News* and *The Guardian* report more than 900 potential deaths of

health care workers (HCWs) in the United States related to COVID-19. At the request of the Office of

the Assistant Secretary for Preparedness and Response at the U.S. Department of Health and Human

Services, the National Academies of Sciences, Engineering, and Medicine’s Standing Committee on

Emerging Infectious Diseases and 21st Century Health Threats will provide a rapid expert

consultation addressing potential methods to better track and understand the causes of HCW deaths

due to COVID-19, and assess the impact of the SARS-CoV-2 pandemic on the physical and mental

health of HCWs.

The consultation should include a review of current resources and methods for tracking and evaluating

HCW deaths related to COVID-19, as well as consideration of potential best practices. COVID-19-

related deaths among HCWs should be construed broadly as including

Deaths due to occupational exposure to COVID-19;

Deaths that could be reasonably assumed to be due to conditions exacerbated by fatigue,

stress, or burnout; and

HCW suicides from March 2020 to present.

The consultation should also assess potential strategies, interventions, and lessons learned in the

support of HCW well-being.

The rapid expert consultation will be conducted in accordance with the policies and procedures of the

National Academies including approval of the Report Review Committee prior to release.

**BOX 2**

**U.S. Centers for Disease Control and Prevention (CDC) Definition of Health Care Personnel**

“**Health care personnel (HCP)** refers to all paid and unpaid persons serving in health care settings

who have the potential for direct or indirect exposure to patients or infectious materials, including

body substances (e.g., blood, tissue, and specific body fluids); contaminated medical supplies, devices,

and equipment; contaminated environmental surfaces; or contaminated air. These HCP may include,

but are not limited to, emergency medical service personnel, nurses, nursing assistants, physicians,

technicians, therapists, phlebotomists, pharmacists, students and trainees, contractual staff not

employed by the health care facility, and persons (e.g., clerical, dietary, environmental services,

laundry, security, maintenance, engineering and facilities management, administrative, billing, and

volunteer personnel) not directly involved in patient care but potentially exposed to infectious agents

that can be transmitted among HCP and patients.”*a*

*a* CDC. Infection control—Appendix 2 terminology: Glossary of terms.

https://www.cdc.gov/infectioncontrol/guidelines/healthcare-personnel/appendix/terminology.html (December 4,

2020).

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**CURRENT REPORTING OF DEATHS FROM COVID-19 AMONG HEALTH CARE**

**WORKERS**

In the context of categories of harm assigned by the Occupational Safety and Health

Administration (OSHA), a death due to COVID-19 could be classed among those due to

“exposure to harmful substances or environments.”4 Notably, no OSHA category counts deaths

specifically from occupationally acquired infection. When a recognized incident, such as a

needle stick, leads to illness and death in an HCW, the occupational source is clear. However,

when an infectious disease is circulating in the community, it may not be possible to trace

individual cases among HCWs to occupational rather than community exposure. Although this

may leave any single case uncertain in origin, measures such as excess disease, hospitalization,

and death among HCWs compared to the general public could indicate the added risk overall due

to occupational exposure.

Risks to HCWs are particularly likely to be under-reported during public health emergencies, and

this continues to be true today amid the COVID-19 pandemic.5 As of November 3, 2020, the

CDC COVID Data Tracker webpage reported 786 HCW deaths attributable to infection with

COVID-19.6 CDC’s mechanism for collecting information about HCW infections currently

relies on coronavirus case report forms, typically completed by local health departments. HCW

occupation type and job setting were not added to the case report form until May 2020, and these

data continue to be frequently missing. Among the 2,633,585 U.S. COVID-19 cases reported

toCDC from February 12 to July 16, 2020, occupational status was available for only 22 percent

(571,708) of cases, among whom 100,481 (18 percent) were identified as “health care personnel”

(see Box 2). Data requirements vary by state. For example, Arizona does not currently report

COVID-19 death data by profession, and while states like Florida and Michigan do provide data

about certain types of HCWs, such as staff in long-term facilities, they do not report on other

types of HCW.7 On top of this range in data standards, data completeness varies greatly by

jurisdiction.

Reporting of COVID-19 infections and deaths among nursing home staff has improved because

of a rule, implemented in May 2020, by the Centers for Medicare & Medicaid Services (CMS).

This ruling requires long-term care facilities to report COVID-19 infections and potential

outbreaks directly to CDC in a standardized format and at a frequency defined by both CMS and

4 OSHA, part of the U.S. Department of Labor, categorizes deaths into one of six distinct categories: transportation

accidents, assaults and violent acts, contact with objects and equipment, falls, exposure to harmful substances or

environments, and fires and explosions. U.S. Department of Labor Occupational Safety and Health Administration.

2020. 1904.8—Recording criteria for needlestick and sharps injuries. https://www.osha.gov/lawsregs/

regulations/standardnumber/1904/1904.8 (December 4, 2020).

5 Sepkowitz, K. A., and L. Eisenberg. 2005. Occupational deaths among healthcare workers. *Emerging Infectious*

*Diseases* 11(7):1003–1008. https://dx.doi.org/10.3201/eid1107.041038.

6 CDC. 2020. CDC COVID Data Tracker. https://covid.cdc.gov/covid-data-tracker/#health-care-personnel

(December 4, 2020).

7 AARP. 2020. How to track COVID-19 nursing home cases and deaths in your state.

https://www.aarp.org/caregiving/health/info-2020/coronavirus-nursing-home-cases-deaths.html (December 4, 2020).

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CDC.8 Failure to report can result in enforcement actions. While this ruling required reporting

starting in May 2020, nursing home facilities have had the option to report cumulative data

retrospectively back to January 1, 2020, and not all facilities chose to, or could do so. As of July

26, 2020, the CMS database reported a total of 12,348 HCW deaths due to confirmed or

suspected COVID-19. This database does not specify whether infections originated at work or in

the community.9

The absence of a uniform national framework and inconsistent requirements across states for

collecting, recording, and reporting HCW mortality and morbidity data associated with COVID-

19 impairs anyone’s ability to make comparisons, do combined analyses, or draw conclusions

about the scale of the problem. Promulgation of a robust national data reporting system,

including collection of data on circumstances and interventions that may raise or lower risk, as

well as data on where the infection occurred, would support the adoption of effective mitigation

strategies and policies to reduce COVID-19 mortality and morbidity in HCWs. Apart from a

national reporting system, epidemiological studies on risk factors for HCWs such as face-to-face

contact with COVID-19 patients, availability and use of PPE, and institutional requirements for

masking could also be informative for policy and practice. Some lessons from a previous

National Academies report on tracking mortality during disasters may be relevant to COVID-19

(see Appendix A).

**MENTAL HEALTH IMPACT OF COVID-19**

Data to assess the impact of the COVID-19 pandemic on the mental health of HCWs such as the

prevalence of burnout and suicide, while limited, point to a serious concern.10 A March 2020

study of HCWs at the forefront of the COVID-19 crisis in China found significant mental and

psychological effects such as anxiety, depression, insomnia, and distress.11 This echoes past

pandemics, such as the 2003 SARS outbreak in Toronto, where one-third of 1,557 HCWs

surveyed reported posttraumatic stress symptoms at levels comparable to those of victims of a

large-scale natural disaster.12

Even in the absence of a pandemic such as COVID-19 or a local SARS outbreak, mental health

risks among HCWs are high. In 2017, 44 percent of physicians reported experiencing symptoms

of burnout, as defined in the emotional exhaustion and depersonalization scales of the Maslach

8 CMS. 2020. Interim final rule updating requirements for notification of confirmed and suspected COVID-19 cases

among residents and staff in nursing homes. https://www.cms.gov/files/document/qso-20-29-nh.pdf (December 4,

2020)

9 CMS. 2020. COVID-19 nursing home dataset. https://data.cms.gov/Special-Programs-Initiatives-COVID-19-

Nursing-Home/COVID-19-Nursing-Home-Dataset/s2uc-8wxp (December 4, 2020)

10 Shreffler et al. 2020. The impact of COVID-19 on healthcare worker wellness: A scoping review. *The Western*

*Journal of Emergency Medicine* 21(5). https://doi.org/10.5811/westjem.2020.7.486847514392.

11 Lai et al. 2020. Factors associated with mental health outcomes among health care workers exposed to

coronavirus disease 2019. *JAMA Network Open* Mar 2;3(3). doi: 10.1001/jamanetworkopen.2020.3976. PMID:

32202646; PMCID: PMC7090843.

12 Maunder, R. 2003. The experience of the 2003 SARS outbreak as a traumatic stress among frontline healthcare

workers in Toronto: Lessons learned. *Philosophical Transactions of the Royal Society B: Biological Sciences*

359(1447). doi: 10.1098/rstb.2004.1483. PMID: 15306398; PMCID: PMC1693388.

6

Burnout Inventory.13 Other studies have shown that women in the health care workforce are

especially at risk of death by suicide; with female registered nurses ranking in the top six major

occupational groups with higher rates of suicides.14 Similarly, a pre-COVID-19 meta-analysis

has shown that physicians died by suicide at a higher rate than the general population.15,16

The full scope of the mental health burden imposed by COVID-19 on HCWs is uncertain. As

with mortality due to COVID-19, there are currently no national systems nor reporting standards

for morbidity measures related to the pandemic, such as mental health status, provider wellbeing,

and other psychological effects on HCWs.

In August 2020, the National Academy of Medicine’s (NAM’s) Action Collaborative on

Clinician Well-Being and Resilience17 stressed that the nation is facing a surge of physical and

emotional harm that amounts to “a parallel pandemic” and “must take responsibility for the wellbeing”

of HCWs, clinicians in particular, responding to COVID-19.18 While some mitigation

strategies are necessary at the organizational level, the NAM Action Collaborative called for

several immediate actions at the national level to lay the groundwork for a clear and accountable

strategy to safeguard the health and well-being of the health care workforce. These include the

implementation of a national epidemiologic tracking program to measure HCW well-being,

assess the acute and long-term effects of COVID-19 on HCWs, and report on the outcomes of

interventions. The NAM Action Collaborative noted that such a national program, ideally headed

by CDC, is needed to comprehensively acknowledge the scale of the COVID-19 crisis and

protect the health care workforce that is already stretched to the breaking point in many

locations.19

**UNIVERSAL MASKING AND PERSONAL PROTECTIVE EQUIPMENT AS A MEANS**

**OF PROTECTING HEALTH CARE WORKERS**

Several studies point to ways to protect and support HCWs from transmissible diseases,

including infection control practices, PPE use, and universal masking.

13 Shanafelt et al. 2019. Changes in burnout and satisfaction with work-life integration in physicians and the general

US working population between 2011 and 2017. *Mayo Clinic Proceedings* 94(9).

https://doi.org/10.1016/j.mayocp.2018.10.023.

14 Peterson et al. 2020. Suicide rates by industry and occupation: National Violent Death Reporting System, 32

States, 2016. *Morbidity and Mortality Weekly Report* 69:57–62. http://dx.doi.org/10.15585/mmwr.mm6903a1.

15 Gold et al. 2013. Details on suicide among US physicians: Data from the National Violent Death Reporting

System. *General Hospital Psychiatry* 35(1):45–49. doi: 10.1016/j.genhosppsych.2012.08.005.

16 Dutheil et al. 2019. Suicide among physicians and health-care workers: A systematic review and meta-analysis.

*PLOS ONE* 14(12):e0226361*.* https://doi.org/10.1371/journal.pone.0226361.

17 The NAM Action Collaborative on Clinician Well-Being and Resilience has the objectives of (1) raising the

visibility of clinician anxiety, burnout, depression, stress, and suicide; (2) improving baseline understanding of

challenges to clinician well-being; and (3) advancing evidence-based, multidisciplinary solutions to improve patient

care by caring for the caregiver. Its products represent the collective opinion of the participants and do not represent

recommendations from the National Academies of Sciences, Engineering, and Medicine.

18 Dzau et al. 2020. Preventing a parallel pandemic: A national strategy to protect clinicians’ well-being. *New*

*England Journal of Medicine* 383. doi: 10.1056/NEJMp2011027.

19 Kursumovic et al. 2020. Deaths in healthcare workers due to COVID-19: The need for robust data and analysis.

*Anaesthesia* 75(8). https://doi.org/10.1111/anae.15116.

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In September 2020, Nguyen et al. published a prospective observational cohort study of

2,035,395 individuals from the general community, including 99,795 HCWs, to monitor the

development of COVID-19 symptoms in those two populations. HCWs were asked to report

weekly on the availability of PPE and the results of any COVID-19 tests they undertook. The

authors found that HCWs were three times more likely to report a positive COVID-19 test

compared with the general population. Follow-up analyses suggested that risk factors for

contracting COVID-19 included inadequate PPE supplies or usage, certain clinical settings (such

as in-patient settings and nursing homes), and minority race/ethnicity.20

Two large studies have demonstrated the importance of universal masking in health care settings

for reducing the risk of nosocomial acquisition of COVID-19. In one study, researchers at the

Duke University Health System in North Carolina prospectively recorded COVID-19 cases

among HCWs across their health system. A specialized team of contact tracers was tasked to

interview affected HCWs to review potential community and occupational exposures. Based on

these investigations, each case was categorized into the following sub-groups: community

acquired, health care associated, or an unknown acquisition route. The study showed that 38

percent of cases were community acquired, 22 percent were health care associated, and 40

percent did not have a clear source of infection. Of the nosocomial cases, 70 percent were linked

to unmasked exposure to another HCW and 30 percent were determined to be due to direct care

of COVID-19 patients. The researchers also found a significant decrease in the cumulative

incidence of nosocomial COVID-19 infections beginning 1 week following the implementation

of universal masking in the hospital while the cumulative incidence rates in community-acquired

cases did not significantly change during that time.21

Similar findings were reported in a study at the Massachusetts General Brigham (MGB) health

care system. In March 2020, MGB implemented an infection reduction strategy involving testing

of symptomatic HCWs and universal masking of health care staff and patients. Before the

intervention, the positivity rate increased exponentially from 0 percent to 21.32 percent;

implementation of universal masking was followed by a significantly lower rate of COVID-19

positivity among HCWs. The authors noted that the decrease in HCW infections could have been

confounded by external mitigation efforts in the community. However, the case numbers

continued to increase in the community during the study period, suggesting that the decrease in

the COVID-19 positivity rate among HCWs was indeed associated with universal masking in the

health care setting.22

In addition to providing physical protection to HCWs involved in the COVID-19 response,

sufficient access to PPE has been shown to undergird HCW well-being. Since the start of the

pandemic, multiple studies from around the world have consistently shown that access to

20 Nguyen et al. 2020. Risk of COVID-19 among front-line health-care workers and the general community: A

prospective cohort study. *The Lancet Public Health* 5(9). https://doi.org/10.1016/S2468-2667(20)30164-X.

21 Seidelman et al. 2020. Universal masking is an effective strategy to flatten the severe acute respiratory

coronavirus virus 2 (SARS-CoV-2) healthcare worker epidemiologic curve. *Infection Control & Hospital*

*Epidemiology* 1–2. doi: 10.1017/ice.2020.313.

22 Wang et al. 2020. Association between universal masking in a health care system and SARS-CoV-2 positivity

among health care workers. *JAMA* 324(7). doi: 10.1001/jama.2020.12897.

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appropriate PPE benefits the mental health of the health care workforce, as reflected in improved

job satisfaction, higher levels of readiness, increased feelings of confidence and safety,

diminished fear of acquiring the infection and passing it on to loved ones, and lower overall

levels distress and anxiety.23

These studies represent building blocks toward a national effort to better understand the scope of

the burden and to identify effective strategies and interventions that support HCW well-being

and safety. Universal masking and access to PPE are two examples of strategies needed to ensure

the safety and well-being of the health care workforce. A comprehensive, integrated national

data tracking and reporting system coupled with well-designed, focused epidemiological

assessments such as those described here, could help identify more effective measures to protect

the health and well-being of the health care workforce.

**APPENDIX A**

**Previous National Academies Report Relevant to Mortality Tracking During Disasters**

In September 2020, the National Academies published a report that reviewed and assessed the

current state of the field and best practices in assessing and quantifying mortality and significant

morbidity following large-scale disasters, which included pandemics. The report found major

challenges in the collection and reporting of accurate information on disaster-related morbidity

and mortality nationwide,24 including

substantial variation across the nation in data collection, recording, and reporting

practices for disaster-related mortality and significant morbidity at state, local, tribal, and

territorial (SLTT) levels;

insufficient prioritization of current systems to ensure more accurate and consistent data

collection, recording, reporting, analysis, and use on mortality and significant morbidity

by stakeholders;

poor functionality and interoperability of data systems to uniformly and effectively

capture, record, and report mortality and morbidity data across multiple stakeholders; and

a need for better training on data collection, recording, and reporting and other support

for medicolegal death investigation system professionals and SLTT agencies.

A number of the findings from this report bear on the challenges with data collection and

reporting during the COVID-19 pandemic, and these challenges have added complexity when

considering HCW COVID-19-related mortality and morbidity. However, the potential solutions

that the report identifies have clear implications for the development of a more comprehensive

understanding of HCW mortality and morbidity due to COVID-19:

23 Shreffler et al. 2020. The impact of COVID-19 on healthcare worker wellness: A scoping review. *The Western*

*Journal of Emergency Medicine* 21(5). https://doi.org/10.5811/westjem.2020.7.48684.

24 National Academies of Sciences, Engineering, and Medicine. 2020. *A framework for assessing mortality and*

*morbidity after large-scale disasters*. Washington, DC: The National Academies Press.

https://doi.org/10.17226/25863.

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Adoption and use of a **uniform national framework** for collecting, recording, and

reporting mortality and morbidity data;

**Investment in improvements to data systems and tools** for collecting, recording, and

reporting individual count data at a SLTT level.

Creation of a process to develop, validate, and promulgate **national standards** for

reporting on a core set of morbidity impacts, including mental well-being and

psychological effects, specific to the common types of public health crises, including

serious infectious disease outbreaks.

Some of these ideas are being adopted in proposed legislation. For example, in October 2020,

U.S. Senators Schatz and Cassidy introduced bipartisan legislation “to create a new permanent

and independent board, the National Disaster Safety Board, to study the underlying causes of

disaster related fatalities and property damage nationwide.”25

National-level solutions specific to HCWs could be extrapolated and tailored further to mitigate

some of the challenges unique to pandemics, in particular to the COVID-19 crisis. For example,

included in the adoption of a uniform framework for collecting, recording, and reporting HCW

COVID-19 mortality and morbidity data and the promulgation of national standards for tracking

and reporting mortality data could be the inclusion or flagging of specific fields in various

reporting systems (including death certificates, hospital data reporting systems, and others) to

track populations of interest. These could be used to track the specific professions of the

deceased, other relevant demographic data, and metrics on the availability of PPE at facilities

where deceased individuals worked, and whether there is evidence that the infection was

acquired at work. The last is of particular importance, though it would require further investment

in the development of robust contact tracing teams specifically trained to investigate HCW

infections and more specifically, to determine the sources of infection (community versus work

acquired). It should be noted that the challenges with this are that contact tracing of HCWs will

be both different and more challenging than contact tracing in the general population (where

exposures to ill patients are much less common) and would require co-reporting of infection

prevention parameters (such as availability of and policies around PPE), levels of exposure, and

genetic analyses of viral strains.

**APPENDIX B**

**Authors and Reviewers of This Rapid Expert Consultation**

This rapid expert consultation was prepared by staff of the National Academies of Sciences,

Engineering, and Medicine, and members and outside experts on behalf of the National

Academies’ Standing Committee on Emerging Infectious Diseases and 21st Century Health

Threats: Sue Anne Bell, University of Michigan, John Hick, University of Minnesota, and

Matthew Wynia, University of Colorado

25 Senator Schatz Press Office. 2020. Schatz, Cassidy to introduce bipartisan legislation to create new independent

board to investigate major natural disasters, make policy recommendations, help save lives.

https://www.schatz.senate.gov/press-releases/schatz-cassidy-to-introduce-bipartisan-legislation-to-create-newindependent-

board-to-investigate-major-natural-disasters-make-policy-recommendations-help-save-lives (December

4, 2020).

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Harvey Fineberg, chair of the Standing Committee, approved this document. The following

individuals served as reviewers: David Blumenthal, The Commonwealth Fund, Elaine Larson

Columbia University, and Julia Bielicki, St. George’s University of London, and Bobbie

Berkowitz, Columbia University, and Sue Curry, The University of Iowa, served as arbiters of

this review on behalf of the National Academies’ Report Review Committee and their Health

and Medicine Division.

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