



# Personal Reflections on Sasakawa Peace Foundation USA's SEED Public Health Delegation

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*This publication was part of Dr. Donahue's participation in Sasakawa Peace Foundation USA's Sasakawa USA Emerging Experts Delegation (SEED) program, where nine U.S. public health experts traveled to Japan from July 31 to August 6, 2022. The 2022 SEED delegates engaged with Japanese public health experts to understand the challenges and opportunities Japan faced in responding to COVID-19 and to explore the avenues for future U.S.-Japan collaboration on public health and emergency preparedness.*

My formal public health career began after completing internal medicine training in 2019. I joined the Center for Disease Control and Prevention's (CDC) Epidemic Intelligence Service; trained in Atlanta, Georgia; was stationed in Lincoln, Nebraska; deployed for public health emergencies locally, nationally, and globally; and served throughout the pandemic in nearly every arm of the response. I led case investigations and contact tracing, investigated transmission dynamics in meat processing facilities, set up mobile testing sites, conducted challenge studies on new testing modalities, helped create vaccine distribution plans, conducted vaccine effectiveness analyses, built a genomic surveillance consortium, and investigated new variants of concern. In addition, I crafted guidance for clinicians, public health departments, and the public. The COVID-19

pandemic highlighted all of our direct connectedness. What happens in California will happen in Nebraska. What happens internationally will happen in the United States. Throughout the pandemic, I have borrowed as many good ideas from national and international leaders as possible—effective response measures, clear communications, and modern surveillance tools. Since transitioning to Nebraska’s state epidemiologist, I have looked for opportunities to connect and collaborate with neighboring jurisdictions and international partners. For example, New York developed excellent cluster detection models. Australia taught Nebraska how genomic epidemiology could inform pandemic response measures. Japan crafted some of the best public health communications in the world. My intent on joining the Sasakawa USA Emerging Experts Delegation on public health was twofold: 1) to dig deeper into Japan’s public health successes to identify response measures that could be reproduced and applied in Nebraska that could reduce morbidity and mortality from the current pandemic, as well as future pandemics; 2) to form and maintain personal connections for more rapid international communications and knowledge-sharing both during and between pandemics. Infectious diseases can “fly” across borders. Knowledge should travel just as quickly.

Prior to SEED, I was aware of Japanese public response in four primary ways:

### 1. *Diamond Princess*

After helping set up traveler screening at Los Angeles International Airport (LAX), and after completing the case investigation and contact tracing for the third case in the United States at Orange County, CA, I returned to Nebraska and began working with our local health departments and the University of Nebraska Medical Center (UNMC) on adapting an active monitoring system for COVID-19. In preparation for seeing cases, we needed to have a system in place to monitor healthcare workers (who would be caring for patients with COVID-19) for symptoms. Soon, on February 17, 2020, Nebraska received 13 passengers from the *Diamond Princess*, a cruise ship docked in Japan. Each passenger was or would become infected. Nebraska’s healthcare worker active monitoring system was ready, used, and subsequently implemented for community exposures statewide.

### 2. Three Cs Public Education Campaign

While face masking guidance and close contact definitions were debated in the US, a clever, simple, evidence-based communication campaign emerged from Japan called the Three Cs, which urged the public to avoid Closed environments, Crowded conditions, and Close-contact settings to limit COVID-19 transmission. Those directions were frequently accompanied by clear images exhibiting each point.<sup>1</sup> Through summer and fall 2020, Nebraska's Department of Health and Human Services incorporated this excellent Japanese tool into our own public health response arsenal and communicated this tool through all levels of government and public health partners.<sup>2</sup> At a time when transmission was rapidly increasing and public health guidance was not always clear, the Three Cs filled a substantial gap and filled that gap well.

### 3. Retrospective/Reverse Contact Tracing

A case investigation is when the patient with an illness is interviewed in order to identify demographics, symptom types, severity, and outcomes. Performing case investigations allows public health authorities to understand who is being infected, where they are being infected, what symptoms are associated with illness, and how many are hospitalized and die. Contact tracing serves to identify others who are exposed, to warn them of their exposure, and to direct them to quarantine and monitor for symptoms. If individuals are quarantining when they develop illness, then the transmission chain is broken. In a case investigation interview, COVID-19 patients were asked who they had encountered during their infectious period, thus identifying those at risk of developing COVID-19 after exposure to the interviewed patient. Subsequently, public health authorities would call that close contact with instructions for quarantine.

Retrospective/reverse contact tracing is potentially more effective, but simultaneously more resource intensive. Instead of (or simultaneously) trying to identify everyone exposed by the interviewed patient, the goal of retrospective/reverse contact tracing is to identify how the interviewed patient was infected. Instead of going forward in time, you look backward in time, hence the name retrospective/reverse contact tracing. When a source of infection could be identified that source might lead to identification of a super-spreading event, where a substantial

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<sup>1</sup> "Important notice for preventing COVID-19 outbreaks. Avoid the 'Three Cs'!", Ministry of Health, Labour and Welfare, n.d., <https://www.mhlw.go.jp/content/3CS.pdf>.

<sup>2</sup> Governor Pete Ricketts, "Avoid the Three Cs," Office of the Governor Pete Ricketts, State of Nebraska, October 21, 2020, <https://governor.nebraska.gov/press/avoid-three-cs>; "Avoid the Three Cs: A Campaign to Promote Healthy Behaviors," n.d., Nebraska Children and Families Foundation, [https://www.nebraskachildren.org/3cs\\_campaign.html](https://www.nebraskachildren.org/3cs_campaign.html).

number of people were infected (e.g., tens to hundreds.) If those exposed through a super-spreading event could be notified of their exposures and quarantine, then a substantial number of transmission chains could be broken.

Critical to the potential utility of retrospective/reverse contact tracing is the concept of overdispersion.<sup>3</sup> A key epidemiologic parameter is the basic reproduction number ( $R_0$ ), which is on average how many people will be infected by someone with the disease. An  $R_0$  of 1.0 means each person, on average, will infect one other person. The  $R_0$  for COVID-19 depends on both the variant's infectiousness and the community prevention measures in place at the time of transmission. Another key epidemiologic parameter is dispersion ( $k$ ), which describes how tightly transmission events cluster (e.g., the lower the  $k$ , the more variation in transmission events, which means transmission more frequently happens in clusters). COVID-19 likely has a low  $k$ , meaning there is a high degree of overdispersion. Plainly, a few infected individuals are responsible for the majority of new infections- superspreading events likely contribute substantially to ongoing disease transmission.

Since the role of superspreading events in COVID-19 transmission is elevated, because of a low  $k$  and high degree of overdispersion, the role of retrospective/reverse contact tracing is even more critical. Through most of the United States, contact tracing was performed in a prospective/forward manner. Simultaneously, it appeared Japan led the way with training and effective implementation of retrospective/reverse contact tracing—a form of contact tracing that likely more effectively reduced disease transmission prior to arrival of more infectious variants like Delta and Omicron.

## 4. Vaccinations and Mortality

Prior to traveling to Japan, I compared Nebraska's and Japan's vaccination proportions and mortality rates. While Nebraska had 40 percent of its population fully vaccinated by April 2021, Japan did not cross that milestone until approximately four months later in August 2021. Despite the slower rollout of vaccinations, Japan now boasts a population 37 percent more fully vaccinated than Nebraska, and 82 percent more boosted with vaccines than Nebraska. When comparing case

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<sup>3</sup> Paul Z. Chen et al., "Understanding why superspreading drives the COVID-19 pandemic but not the H1N1 pandemic," *The Lancet*, August 2, 2021, [https://www.thelancet.com/journals/laninf/article/PIIS1473-3099\(21\)00406-0/fulltext](https://www.thelancet.com/journals/laninf/article/PIIS1473-3099(21)00406-0/fulltext).

rates and mortality rates through incident rate ratios spanning the duration of the pandemic, and after controlling for the vastly different population sizes, Japan experienced a 2.5x lower case rate and an 8x lower mortality rate. While some Japanese subject matter experts express disbelief at the low Japanese mortality rates, I have not yet seen evidence supporting that doubt. It appears the risk of dying from COVID-19 in Japan, over the duration of the pandemic, was approximately eight times lower than the risk of dying from COVID-19 in Nebraska.

As each of these topic areas were explored in our virtual and in person SEED meetings, I began seeing themes emerge around unique Japanese successes and challenges in pandemic response. One key theme was the ability of the Japanese government to include both public and private/academic subject matter experts to inform guidance and public communications. Japan's governmental COVID-19 Advisory Board included economists and private/academic subject matter experts, in addition to qualified public/governmental staff. This collaboration between public/governmental and private/academic professionals created Japan's Three Cs communication, which was successful globally and is still in use during surges in Nebraska. Bringing everyone to the table made this public health communications plan happen and made it stick. Equally critical was maintaining consistent communications and guidance from the beginning to the end. The United States changed guidance around masking and quarantine for vaccinated individuals twice. As far as I can tell, Japanese guidance around masks and exposures has been consistent. It is very appropriate to update communications and guidance when updated science or new findings require updates. Taking that into account, guidance should stay consistent as much as possible for simplicity, for perceived integrity, and for effectiveness. The Three Cs is as good of a tool now as it was at its inception. It is a useful tool for other respiratory viruses, as well. While U.S. guidance might sometimes get lost in its own complexity, many Nebraskans still remember the Three Cs.

While COVID-19 pandemic success was found in clear and consistent guidance, success was also found despite the absence of restrictive governmental interventions. While parts of the United States and parts of the world forcefully shut down segments of communities (e.g., lockdowns), Japanese law precluded a similar approach. It is in this combination of factors where a key lesson might be found for future pandemic response. Despite the absence of lockdowns, Japanese

mortality remained low. It appears clear and consistent guidance, when adopted by a critical mass of the population in Japan, can be effective even in the absence of strict lockdowns. The remaining variable in this equation is people, and their willingness to follow public health guidance. My perception of Japanese culture includes an elevated level of care for other individuals in the community. While my perception is shaped by a very short duration of real-life observations, the pervasiveness of mask wearing that remains everywhere (e.g., meetings, hotels, streets, restaurants) more than two years into the pandemic, is a strong argument. An elevated level of care for others and an elevated trust in public health is also reflected in Japanese vaccination rates, which are some of the highest in the world. Clear and consistent guidance among a population willing to receive that guidance appears to be a winning combination for producing uniquely low mortality rates during a respiratory virus pandemic.

Low mortality rates in the setting of limited restrictive governmental interventions should be our target and should be the principal measures of a successful pandemic response. While Japan has and is achieving this goal, challenges existed in operationalizing some components of response. Testing capabilities were delayed, and overall testing throughput remains lower than similar nations. Faxes are frequently used to report laboratory results in lieu of electronic reporting. Antigen tests still require PCR confirmation, which ties up valuable clinical resources and suppresses overall testing capacity. Vaccine rollout took longer to operationalize than similar nations. Vaccine administrations are still recorded on paper and faxed in lieu of electronic reporting. Local health departments are unable to administer vaccine, requiring clinicians to fill this critical role and further stressing clinical resources. Genomic epidemiology for COVID-19 is budding and still developing. Despite these perceived challenges, the principal measures of success remain the same, and Japanese mortality rates remain low in the absence of restrictive interventions.

Two of the greatest pandemic challenges are shared equally between Japan and Nebraska/U.S. Tracking COVID-19 hospitalizations emerged as a critical indicator of pandemic severity and protecting hospital capacity became the key guiding principle of Nebraska pandemic response. Entering into the pandemic, no national system existed in the United States to accurately track hospitalizations, similar to Japan. While work is ongoing, neither country to my knowledge has

yet to create an effective national hospitalization surveillance system. This remains a critical goal and need, which must be met before another pandemic arises.

The eventual demise of contact tracing as a key response pillar was another shared challenge. As the pandemic evolved, we learned that the utility of contact tracing to contain COVID-19, or even to effectively reduce transmission, was greatly diminished for three main reasons: (1) asymptomatic/presymptomatic transmission for SARS-CoV-2 can spread prior to knowing you're ill; (2) mild illness predominance might make one think it is a cold or allergies and thus would not isolate; and (3) a short incubation period, now as short as three days, is a very short duration of time to report a lab result, conduct an investigation, identify, and notify contacts of exposure. Although the benefits of retrospective/reverse contact tracing in the setting of overdispersion remains, its potential utility diminished each time SARS-CoV-2 evolved to become more infectious, requiring indefinitely more and more resources. As Omicron emerged and became predominant, contact tracing of any sort (prospective/forward or retrospective/reverse) ceased to be an effective use of public health resources both in Nebraska/U.S. and in Japan. Thus, broad communitywide contact tracing took a backseat to targeted investigations, vaccination, masking, and non-pharmaceutical interventions (NPIs) globally.

I have very much enjoyed the diverse meetings from Japanese governmental, academic, clinical, and media experts. I am incredibly thankful for the experts' time and willingness to share, as well as for our host, Sasakawa Peace Foundation USA, and the huge amount of time and resources invested in bringing the delegation together. SEED has been rewarding both personally and professionally. Personally, I was able to visit a part of the world I had never experienced before. I was able to carefully interact (while wearing a mask) with a culture that placed great value on community and public health. Japan is a country and culture full of natural beauty and character; I refreshed myself in the midst of fellowship and shared experience. Professionally, I cemented the importance of clear, consistent guidance in public health response, and I learned that many data-related challenges in response are shared and similar across oceans. Building a hospitalization surveillance system and ensuring our local capabilities for retrospective/reverse contact tracing for future respiratory pandemics will be key initiatives moving forward. Ensuring private/academic experts, and experts from diverse fields (e.g., economics) are involved in our future pandemic

response will also be a focus. As important as these lessons and targets are, the connections I have made are equally important. As a result of this SEED trip, I now have direct connections to Japanese public health and clinical experts and will lean on these connections in the future. By connecting in person, American and Japanese public health practitioners made long-lasting relationships and through these connections we can understand the diversity in pandemic public health response. Through understanding different successes and failures, American and Japanese public health experts can better build a future-capable system. There is global solidarity in the need for refocusing and supporting public health, to build the effectiveness and resilience that is required on a grander scale, for all our futures. Sasakawa Peace Foundation USA and this SEED Public Health Delegation is helping address this need. Thank you.

*Dr. Donahue wrote in his personal capacity. The views and interpretations expressed by the author are solely his own.*



*Matt grew up and completed medical school in Iowa, traveled to Upstate New York for internal medicine, and returned to the Midwest (Nebraska) for fellowship in applied epidemiology through CDC called the Epidemic Intelligence Service. In addition to treating patients, Matt has found great joy and intrigue in applied epidemiology and global health. Domestically he has supported responses to gastrointestinal and respiratory disease outbreaks, developed a surveillance system for EVALI (e-cigarette or vaping-related lung injury), developed airport screening protocol for COVID-19 at LAX, completed the case investigation for the 3rd COVID-19 case in the United States, supported Nebraska local health departments in their COVID-19 investigations, helped lead testing studies and expanding testing initiatives and investigations across Nebraska, and led the development of variant of concern, reinfection, and vaccine breakthrough surveillance systems. Internationally he has worked on HIV and opportunistic infections in South Africa, helped develop a global health program in rural Peru, and led epi teams during the polio response in Ghana. In addition to continuing work on the COVID-19 and monkeypox responses in Nebraska, he enjoys spending time with his wife Brooke and two daughters.*

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