Relevance to Military Health Statement

The proposed research project is highly responsive to the healthcare needs of military service members, veterans, and beneficiaries, specifically in regards to pandemic preparedness and response. The emergence of new strains of influenza viruses with the potential to cause pandemics is a global threat with significant implications for the health and safety of military personnel. Here we briefly discuss the incidence and/or prevalence of influenza in the general population as well as in military service members, veterans, and beneficiaries, describe the population(s)/dataset(s) to be used in the proposed research project, and provide a description of how the knowledge, information, products, technologies, or applications gained from the research could be implemented in a dual-use capacity to benefit both military and civilian populations.

Incidence and Prevalence of Influenza: Influenza is a highly infectious respiratory illness caused by the influenza virus. It affects millions of people worldwide each year and is responsible for a significant number of hospitalizations and deaths. According to the Centers for Disease Control and Prevention (CDC), in the United States alone, the estimated number of influenza-associated illnesses ranges from 9 million to 45 million annually, resulting in between 140,000 and 810,000 hospitalizations and between 12,000 and 61,000 deaths in a typical flu season[49]. Military service members, veterans, and beneficiaries are not immune to the effects of influenza, and the Department of Defense (DoD) reports that influenza-like illness is one of the top five reasons for medical encounters among service members[50]. In addition, influenza can have a significant impact on military readiness, with outbreaks resulting in decreased personnel availability and decreased mission effectiveness[51].

Population and Dataset: The proposed research project will utilize a combination of publicly available genetic sequence data and epidemiological data from influenza surveillance programs. Specifically, the Global Initiative on Sharing All Influenza Data (GISAID) and the National Center for Biotechnology Information (NCBI) databases will be used to collect genetic sequence data on influenza viruses collected from human and animal hosts. Epidemiological data will be obtained from the World Health Organization (WHO) and the Centers for Disease Control and Prevention (CDC), including information on the geographic distribution of influenza strains and the incidence and prevalence of disease.

The use of these datasets is highly appropriate for the proposed research project. The GISAID and NCBI databases contain a wealth of genetic sequence data on influenza viruses collected from around the world. These databases are regularly updated and publicly available, ensuring that the research can be replicated and extended by other researchers. Additionally, the epidemiological data obtained from WHO and CDC are widely recognized as authoritative sources of information on influenza surveillance and are used by public health agencies around the world to track the spread of influenza.

Accessing these datasets is feasible, as they are publicly available and regularly updated. The use of these datasets also enables the research to be conducted at scale, allowing for the identification of emerging strains and the analysis of their evolutionary trajectories in a timely and efficient manner.

Dual-Use Capacity: The knowledge and technologies gained from this research could be implemented in a dual-use capacity to benefit both military and civilian populations. The ability to predict and preempt the emergence of pandemic strains of influenza viruses has significant implications for global public health and biosurveillance efforts. By developing the BioNORAD platform, we can not only protect military personnel but also contribute to global efforts to prevent and respond to emerging infectious diseases.

The knowledge gained from this research project could also be applied to other infectious diseases with pandemic potential, such as coronaviruses and other respiratory viruses. The methods and algorithms developed as part of this work can be applied to other viruses with pandemic potential, potentially improving our ability to predict and respond to future pandemics, enabling us to act quickly and decisively to prevent the spread of the virus and save lives.

In conclusion, the proposed research project is highly responsive to the health care needs of military Service Members, Veterans, and/or beneficiaries. Influenza viruses are a major threat to military personnel deployed overseas, and the ability to predict and preempt pandemic strains of influenza viruses has significant implications for the health and safety of military personnel. The use of publicly available datasets and the interdisciplinary collaboration involved in this research project make it a highly feasible and appropriate approach to the problem. Finally, the dual-use potential of the research has significant implications for global public health and biosurveillance efforts, making it a critical investment in the future of both military and civilian populations.