This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

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An American National Standard

Standard Guide for Continuity of Maritime Operations During the Onset of a Pandemic[1]

This standard is issued under the fixed designation F3649/F3649M; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This guide covers information, best practices, or a series of options, or combinations thereof, to be used by the maritime industry to assist with continuity of international and domestic maritime operations during a pandemic. The information provided herein may also be useful when a vessel is in an area with a localized epidemic as well. The focus of this guide is on actions to protect a vessel's crew and passengers from the effects of a pandemic to the greatest extent possible.

1.2 *Units*—The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system are not necessarily exact equivalents; therefore, to ensure conformance with the standard, each system shall be used independently of the other, and values from the two systems shall not be combined.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Terminology

2.1 *Definitions:*

2.1.1 *anti-viral medicines, n*—class of drugs used to treat viral infections.

2.1.2 *asymptomatic, adj*—carrier of an illness not showing symptoms.

2.1.3 *cleaning, v*—removal of foreign material (for example, soil and organic material) from objects and normally accomplished using water with detergents or enzymatic products.

2.1.4 *close contact, n*—any person who has been near to a person with a contagious disease or anyone who repeatedly and regularly shares the living space of someone with a contagious disease.

2.1.5 *cluster, n*—collection of cases occurring in the same place at the same time.

2.1.6 *community spread, n*—circulation of a disease among people in a certain area with no clear explanation of how they were infected.

2.1.7 *confirmed case, n*—person with laboratory confirmation of a pandemic/epidemic infection.

2.1.8 *coronavirus, n*—family of viruses known to infect people that get the name from the crown-like spikes (coronas) that appear on the viruses under a microscope.

2.1.8.1 *Discussion*—Coronaviruses can cause the common cold, as well as dangerous illnesses such as severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS).

2.1.9 *Coronavirus Disease 2019, COVID-19, n*—disease can cause mild to moderate illness in most people and in others it has caused life-threatening pneumonia and death.

2.1.10 *disinfection, n*—process that eliminates many or all pathogenic microorganisms, except bacterial spores, on inanimate objects.

2.1.11 *droplet transmission, n*—form of direct transmission; this is a spray containing large, short-range tiny particles suspended in air produced by sneezing, coughing, or talking.

2.1.12 *endemic, adj*—expected level of the disease that always exists without eradication and is usually at low, predictable rates.

2.1.13 *epidemic, n*—sudden increase in the number of cases of a disease above what is typically expected.

2.1.14 *hand hygiene, n*—washing hands with soap, water, alcohol, or other disinfectant.

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2.1.15 *incubation period, n*—time between when a person is infected by a virus and when symptoms of the virus/disease are noticed.

2.1.16 *isolation, n*—keeping people with confirmed cases of a contagious disease separated from people who are not sick.

2.1.17 *microbe, n*—minute organism typically visible under a microscope.

2.1.17.1 *Discussion*—Microbes include bacteria, fungi, and protozoan parasites.

2.1.18 *N95 respirator, n*—respirator/mask worn on faces forming a tight seal around the nose and mouth.

2.1.18.1 *Discussion*—The N95 respirator/mask filters out at least 95 % of particles in the air.

2.1.19 *outbreak, n*—refers to a more limited geographic area of virus/disease infection within an epidemic.

2.1.20 *pandemic, n*—epidemic that spreads over several countries or continents or both impacting many people.

2.1.21 *pathogen, n*—microorganism that causes, or can cause, disease.

2.1.22 *personal protective equipment, PPE, n*—specialized clothing or equipment worn by an employee for protection against infectious materials.

2.1.23 *quarantine, n*—separating and restricting the movements of people who were exposed to a contagious virus/disease in order to prevent spread of the disease.

2.1.24 *sanitation, n*—process of keeping drinking water, foods, or anything else with which people come into contact free of microorganisms such as viruses.

2.1.25 *self-isolation, n*—voluntary agreement that a person is remaining at home or in a designated place.

2.1.26 *self-monitoring, v*—checking yourself for symptoms of virus or infection.

2.1.27 *severe acute respiratory syndrome, SARS, n*—causes fever, headache, body aches, a dry cough, hypoxia (oxygen deficiency), and usually pneumonia.

2.1.28 *severe acute respiratory syndrome coronavirus 2, SARS-CoV-2, n*—virus that causes COVID-19.

2.1.29 *shelter-in-place order, n*—decree by authorities for people to stay in their homes or assigned places except for going out for essential needs.

2.1.30 *social distancing, v*—physical distancing between yourself and other people.

2.1.31 *spread of disease, n*—when a disease/virus begins to spread with possible frequency, patterns, and causes associated with it; the following definitions are a few of those epidemiological terms that you may hear or see reported in the news, especially as they relate to COVID-19.

2.1.32 *super spreader, n*—a highly contagious person or persons who can infect an unusually large number of people.

2.1.33 *surveillance (as in surveillance of an ongoing pandemic/epidemic), n*—closely watching a patient's condition but not treating it unless there are changes in symptoms or test results.

2.1.33.1 *Discussion*—Surveillance is also used to find early signs that a disease has returned.

2.1.34 *suspected case, n*—any person (including severely ill patients) presenting with symptoms of a pandemic/epidemic and whom, within an appropriate time period before the onset of illness, had any of the following exposures: *(1)* history of travel to and more than 24 h transit through any high-risk country with widespread community transmission of the pandemic/epidemic, *(2)* close contact with a confirmed case of the pandemic/epidemic, or *(3)* exposure to a healthcare facility where the pandemic/epidemic case(s) have been reported.

2.1.35 *vaccine, n*—medical injection designed to trigger the immune system to help it build immunity to a disease.

2.1.36 *vector, n*—living organism that can transmit infectious pathogens between humans or from animals to humans.

2.1.37 *ventilator, n*—machine to help patients breathe when their lungs are damaged and they cannot get enough oxygen on their own.

3. Summary of Guide

3.1 This guide includes reference material and terminology to support the user with information in operating in a pandemic environment. This guide covers identification of infection types/characteristics, risk assessments/hazard characteristics and approaches such as bow tie analysis, and control measures/strategies for mitigations of virus spread, as well as structure and elements to include in a pandemic response plan.

4. Significance and Use

4.1 This guide is designed to be used both onboard a vessel and by the operating entity ashore. It should be recognized that this guide provides general information applicable across all sectors of the maritime industry. Because of the nature of pandemics, it cannot provide detailed information concerning a specific type of pandemic, nor can it provide specific recommendations applicable to all sectors of the maritime industry. It should be used to provide a starting point and reference as to the best practices and actions that should be taken to protect the vessel and its crew and passengers.

5. Risk Assessment/Hazard Characteristic Approach/Bow Tie Analysis

5.1 A hazard analysis is important for evaluating potential infection spread and impact to operations at all levels from global all the way down to localized spread. Once an infectious outbreak is identified and is spreading from person to person in a sustained manner, assessing spread rates, severity, transmissibility, and other characteristics is required to evaluate pandemic severity and potential impacts for the employees and continuity of operations. A positive case onboard a vessel has a higher risk of creating a spread of infectious disease because of the nature of the close working and living conditions for significant time periods. These time periods are beyond the periods used for close-contact guidance, thereby increasing risk and likelihood of an outbreak onboard.

5.2 There are two main factors that can be used to determine the impact of a pandemic. The first is clinical severity of the

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serious is the illness associated with infection as reported by medical experts. The second factor is transmissibility or how easily the pandemic virus spreads from person to person. To help ascertain severity and transmissibility, companies will likely need to use the expert services of mariner medical providers or specialist agencies, or both. These two factors combined can be used to guide decisions about which actions should be taken at a given time during the pandemic.

5.3 The Centers for Disease Control and Prevention (CDC) has information on its website (www.cdc.gov) that addresses assessing risk factors for severe illness and pandemic conditions. Information is periodically updated as conditions change. Some potential risk factors could include, age, race/ethnicity, gender, some medical conditions, use of certain medications, poverty and crowding, certain occupations, and pregnancy. Through a variety of investigations as identified on its website, CDC continues to further identify and refine risk factors for severe illness and pandemic environments.

5.4 *Risk Assessment*—There are several risk assessment methodologies that can be used to help identify and document risk while attempting to minimize or reduce the likelihood or severity of risk, or both. One such methodology is a bow tie analysis. A bow tie analysis is a simple process for identifying where new or enhanced controls may be worthwhile. It is a core part of risk treatment planning, particularly when there is a high level of risk or control effectiveness is assessed as low.

5.4.1 A bow tie analysis is read from left to right and there should be a logical flow. Creating a bow tie analysis starts in the middle with the hazard and the event that you are trying to analyze. On the left side, list all the potential causes or threats that would lead to the event happening. List all probable and possible causes. On the right side, list the consequences that could happen if the event linked to the hazard was to occur.

5.4.2 Review what you have written and determine whether the event linked to the hazard could happen and if the linked consequence could happen. If there is a logical flow, then that cause or consequence or both is correct. If it does not flow logically, then that is not a true cause or consequence, or both.

5.4.3 After review for logical flow, begin determining control measures that can be put in place to prevent that cause on the left side of the diagram from happening; think about breaking the flow. For each control put in place, rank them from high to medium to low in terms of effectiveness. Do the same for the consequences on the right side of the chart, determining what mitigation steps can be taken to prevent the consequence from occurring.

5.4.4 Creating a bow tie analysis will provide a complete analysis of the risk management for any type of hazard and can be an effective method used to illustrate prevention and response plans to crew and internal and external customers. Fig. 1 is a representative diagram.

6. Infection Type/Characteristics

6.1 Bacteria and viruses can both cause mild to serious infections and they are different from each other. This is important to understand because bacterial and viral infections shall be treated differently. Misusing antibiotics to treat viral infections contributes to the problem of antibiotic resistance, where bacteria develop the ability to defeat the drugs designed to eliminate them.

6.1.1 Bacteria and viruses are too tiny to be seen by the naked eye, can cause similar symptoms, and are often spread in the same way, but that is where the similarities end.

6.1.2 A bacterium is a single, but complex, cell. It can survive on its own inside or outside the body. Most bacteria are not harmful. In fact, we have many bacteria on and inside our body, especially in the gut to help digest food.

6.1.3 Viruses are smaller and are not cells. Unlike bacteria, they need a host such as a human or animal to multiply. Viruses cause infections by entering and multiplying inside the host's healthy cells.

6.2 *Bacterial Versus Viral Infection:*

6.2.1 As the names suggest, bacteria cause bacterial infections, and viruses cause viral infections.

6.2.2 It is important to know whether bacteria or viruses cause an infection because the treatments differ. Examples of bacterial infections include whooping cough, strep throat, ear infection, and urinary tract infection (UTI). Viral infections include the common cold, influenza, most coughs and bronchitis, chickenpox, HIV/AIDS, SARS, and COVID-19.

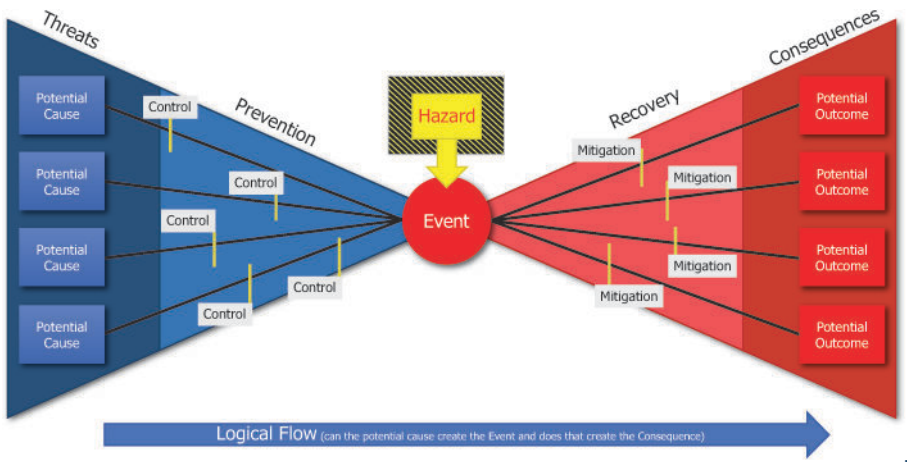

FIG. 1 Bow Tie Diagram

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