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## An influenza A outbreak in Iranian individuals following Arba'een foot pilgrimage from October to December 2019

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*To the Editor*—Influenza A (flu) is a viral infection that involves the human respiratory system mostly in cold seasons.<sup>1–3</sup> For most individuals, this infection is not problematic, but it can cause death.<sup>1</sup> The transmission of this disease is done in 2 direct and indirect ways.<sup>4</sup> Direct transmission occurs person-to-person: respiratory droplets are transmitted from infected to healthy individuals over a short distance.<sup>4</sup> The influenza virus can survive for hours in cold conditions and in low humidity in the environment. Hand contact with contaminated surfaces or objects can transmit the virus indirectly thorough inoculation of the eyes, nose, and mouth.<sup>4</sup> Individuals at high risk for developing deadly flu are members of the following groups<sup>5</sup>: (1) adults >65 years of age, (2) children <5 years of age, (3) pregnant women, (4) individuals with weakened immune defenses, (5) individuals with chronic disorders (eg, heart disease, asthma, kidney disease, diabetes as well as liver disorder), and (6) obese individuals. Up to 650,000 deaths annually are associated with respiratory diseases from seasonal influenza, according to new estimates by the Centers for Disease Control and Prevention (CDC), the World Health Organization, and their global health partners.<sup>6</sup> In 2019, in Western Asia, influenza activity remained elevated overall and continued to increase in Iraq, Israel, Jordan, Turkey, and Yemen.<sup>7</sup>

During the 20th and 21st centuries, 5 influenza pandemics have been recorded: Spanish (1918–1920), Asian (1957–1958), Hong Kong (1968–1969), Russian (1977–1978), and H1N1/09 pandemic flu (2009–2010).<sup>8</sup> During the last pandemic of influenza (June–November 2009), 2,662 cases of pandemic influenza A (H1N1) were detected in Iran. Among these cases, 58 patients died.<sup>8</sup> The most common influenza A outbreaks in Iran had been H1N1, the most severe form of the disease, which accounted for ~90% of all cases.<sup>9</sup> Seasonal influenza is among the most prevalent infectious diseases in travelers.<sup>10</sup> In tropical areas, influenza viruses may circulate throughout the year with several seasonal peaks, whereas in the moderate climate zones, circulation is largely limited to 1 or 2 peaks in the fall and winter months.<sup>10</sup> Studies have shown the relationship between overcrowding and increased prevalence of influenza.<sup>11</sup> Thus, whenever and wherever high population density

occurs, the likelihood of transmission and spread of influenza is higher. Globally, one of the most overcrowded events is Arba'een, and it is accompanied by a high incidence of the flu every year.

Arba'een, the 40th day, is a religious event observed in many Islamic countries; it is one of the largest pilgrimage gatherings on Earth.<sup>12</sup> In this event, up to 17 million people from Islamic countries such as Iran, Pakistan, Turkey, Afghanistan, Azerbaijan, Lebanon, Kuwait, Bahrain, Saudi Arabia travel to Karbala city in Iraq.<sup>12</sup> A significant percentage of this population is Iranian.<sup>12</sup> In 2018, 123,000 Iranian pilgrims had symptoms of illness upon returning to the border, and ~5,000 needed treatment due to flu.<sup>13</sup> In 2019, 30,000 cases of influenza were reported overall, and 106 of these patients died. According to reports from Ministry of Health and Medical Education of Iran, between the beginning of October 2019 and December 2019, after pilgrims returned from Iraq, 8,333 people went to medical centers because of respiratory illness, half of whom required >2 days of hospitalization due to the severity of respiratory illness and 106 of whom died.<sup>14</sup> The rest were discharged with outpatient or temporary hospitalization.<sup>14</sup> Many factors are involved in influenza prevalence in the Arba'een.<sup>3</sup> (1) Many pilgrims suffer from general weakness and fatigue due to a lengthy walk; some walk ~200 km. (2) Overcrowding occurs in huge tents called *mukeb*, which cover thousands of people, and congestion in and around the shrine is high, increasing the risk of flu 10-fold.<sup>11</sup> (3) Hygiene is poor due to inadequate availability of showers and toilets. (4) The Arba'een event takes place during the cold-weather season in a geographic location with moderate climate. (5) Access to appropriate food during travel is limited. When a person has the flu, it is crucial to eat small amounts of the right foods to provide it with energy and nutrients for recovery). (6) Inadequate sleep can affect the immune system. Pilgrims who do not get quality sleep or enough sleep are more likely to get sick after being exposed to the flu virus. (7) Individuals from different countries can carry mutant and virulent influenza virus. Because of these problems and conditions in the Arba'een pilgrimage, recommend several ways for pilgrims to prevent flu outbreaks in these places<sup>15</sup>:

- 1) Wash hands several times a day with liquid soap and water as well as alcohol rub if it is available.
- 2) Avoid contact with contaminated hands, eyes, and mouth.

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- 3) Use respiratory masks during close contact with people, and try to change the masks often.
- 4) Maintain several meters distance from other pilgrims.
- 5) Avoid contact with other pilgrims who appear ill.
- 6) Obtain vaccination (high-risk individuals).
- 7) Avoid shaking hands and kissing during greetings.
- 8) Wear mask and gloves during the pilgrimage and touching the shrine.

Also, if individuals appear with signs and symptoms of flu, the following measures should be taken<sup>15</sup>:

- 1) Use a mask to cover the mouth and nose.
- 2) Cover the nose and mouth with their arm/sleeve or a napkin when sneezing or coughing.
- 3) Placed used napkin or tissue in a plastic bag, then close the bag and throw it in the trash.

Observing such measures can greatly reduce the spread of influenza virus during the Arba'een pilgrimage.

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# Applying behavioral frameworks to antimicrobial stewardship

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*To the Editor*—The effectiveness of healthcare improvement initiatives is highly dependent on the social, psychological, organizational and cultural dynamics of clinical settings.<sup>1,2</sup> Historically, in antimicrobial stewardship, most interventions have been broadly implemented without taking these important contextual factors into account, despite research demonstrating the importance of adaptation to the local context.<sup>3,4</sup> Furthermore, the recommended metrics for assessing the impact of interventions do not take into consideration the dynamics between the clinician and

antimicrobial stewardship team, making it more difficult to predict the long-term success of a program.<sup>5</sup> Existing behavior-change models can be applied to determine how the intended recipient of an intervention might respond to initiatives that seek to change behavior in order to optimize the uptake and sustainability of antimicrobial stewardship interventions.

Prochaska and DiClemente's transtheoretical model (TTM) is one such framework. It consists of 5 stages that conceptualize how people change their health behavior.<sup>6</sup> In the initial stage, precontemplation, the individual does not intend to take action within the next 6 months. In stage 2, contemplation, action is intended within the next 6 months. Stage 3 is preparation, in which action is intended within the next 30 days; stage 4 is action, in which

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