SCIENTIFIC LETTERS

Risk assessment and preventive strategies during massive religious events: the romeria pilgrimage of western Mexico

Evaluación de riesgos y estrategias preventivas en eventos religiosos masivos en México occidental: La Romería

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Religious mass emergencies involve organized, recurrent events in the same scenario, which facilitates planning, risk assessment and the possibility of monitoring them. In this way, it is possible to integrate a legacy in the analysis of previous experiences, on which the prevention strategies determined by the WHO (World Health Organization)[1-3] are based. The Pilgrimage is an example of massive events that have relevance for public health. This worship dates back to 1734 and is characterized by the return of the Virgin of Zapopan to her temple home, after visiting other temples and communities on October 12. In 2018, the United Nations Educational, Scientific and Cultural Organization (UNESCO) nominated this massive religious event as Intangible Cultural Heritage of Humanity, estimating an average participation of 2 million people[4,5].

The training of health personnel in mass medical emergencies (management guides, emergency life support course and education based on a study program and simulations), as well as the setting up of ambulatory medical care posts (PAMA in Spanish) during the event, are key to providing preventive and adequate care[6]. Knowledge of risk factors and environmental conditions in the region is necessary to improve prevention strategies for infectious diseases, accidents or incidents of violence.

In this retrospective observational study, demographic data and incidents recorded during La Romería, which takes place in the metropolitan area of Guadalajara (Mexico) and which were registered in the PAMAs, were analyzed. Medical health personnel, emergency and rescue technicians, nurses and social workers, as well as public safety and road safety personnel made up the teams of each unit, which were distributed at the points of highest concentration of people along the 9.4 km of the route. Incidents were classified according to a generic institutional catalog of emergency reports, with a more precise breakdown in a file for cases requiring hospital transfer. The data were estimated in statistical measures of central tendency, analyzed through the SPSS program (IBM 17.0), by means of averages, medians and distribution percentages. Regarding the general registry of participants, only the cases that required medical attention during the event were counted. The institutional ethics committee classified it as a descriptive study without therapeutic intervention and without risk for the participants according to registry 23/OFCJAL/2020, of the state research registry.

During the evaluated period of 5 years (2015-2019), the cumulative records of a global coverage of 8.9 million pilgrims were analyzed, with an average annual participation of 1,780,000 people. The increase in pilgrims has been progressive (between 20% and 25% from 2015 to 2019). The route traveled was on a 9.4 km route over the time course of 2 days, with some minor modifications. Demographic data reported that the majority of pilgrims were older adults, followed by young adults, with a predominance of women at 60% and presence of children at 30%. October is a month that usually presents 10% humidity, a temperature of 18°C and a 20% chance of rain, so the environmental conditions are considered in the risk map.

The incidents collected (Table 1) showed a percentage decrease, comparing 0.026% in 2015 with 0.015% in 2019. Of the incidents collected in averages and percentages, the most common was muscular affection associated with fatigue (muscle pain), followed by minor injuries and excoriations on lower limbs, hypertensive crisis and gastrointestinal affections (vomiting or diarrhea). Other minor events recorded were alterations in plasma glucose concentration (hypoglycemia or hyperglycemia), dehydration and convulsions, with 7.8% and 2.4% of cases, respectively (Table 2).

Healthcare personnel trained in mass medical emergencies and pre-hospital care progressively increased from 2,600 people in 2015 to 8,200 in 2018. They were also integrated into a network of 40 PAMAs that were strategically located along the route. This represented an overall increase of 31% in the participation of trained healthcare personnel, and PAMAs increased 6-fold during the period studied. Preventive education to attendees through informational brochures, as well as increased technical training to teams of healthcare personnel in prevention, life support training and emergency medicine, were carried out systematically.

Finally, due to the humid weather conditions after the rainy season, it was considered important to strengthen preventive measures against the transmission of vector-borne diseases, such as Dengue. To this end, preventive spraying and fogging were carried out to control the proliferation of the Aedes Aegypti mosquito in streets and buildings in an area of 80 blocks, and 5,000 mosquito repellent patches were distribut-

Table 1. Comparative description over 5 years of La Romería

Year	People (peregrines)	Medical incidences*	Collaborating personnel**	Distance	Healthcare and security posts
2015	1.5 Millions	398 (0.026%)	2,600	9,413 m	6
2016	1.8 Millions	184 (0.010%)	3,500	9,413 m	38
2017	1.8 Millions	429 (0.023%)	7,000	9,413 m	40
2018	2 Millions	173 (0.008%)	8,200	9,413 m	40
2019	1.8 Millions	285 (0.015%)	7,190	9,413 m	250***

*Health incidents attended in Ambulatory Medical Attention Posts (PAMA).
**Health and security personnel.
***250 PAMA and security posts.

Table 2. Overview average with percentages of health incidents reported during the pilgrimage of La Romería, in one of the reference PAMAs in the area adjacent to the meeting point (temple), in a cross-sectional report

Recorded medical incidents N = 167	Frequency n (%)
Muscular affections (muscle pain)	68 (40.7)
Injuries in lower extremities (excoriations)	37 (22.1)
Hypertensive conditions	18 (10.8)
Gastrointestinal diseases (vomiting/diarrhea)	13 (7.8)
Glucose disturbances (hyperglycemia or hypoglycemia)	13 (7.8)
Dehydration symptoms	7 (4.2)
Seizures	4 (2.4)
Cardiopathy (precordial pain)	3 (1.8)
Intoxications	2 (1.2)
Fever	1 (0.6)
Injuries to upper extremities (excoriations)	1 (0.6)

ed, which contributed to the prevention of outbreaks of Dengue fever in the immediate aftermath. In the prevention of gastrointestinal diseases and waste recycling, sanitary surveillance was increased at street food stands and 1,600 liters of purified water for human consumption were distributed under specific instructions for the plastic waste disposal system under a recycling strategy. This action contributed to facilitate the separate collection of garbage, which decreased from a total of 52 tons in 2018, to 33 tons in 2019.

Mass events are characterized by a high flow and concentration of people in defined spaces, which represents specific concerns from a public health perspective. Religious type concentrations have particularities that allow the planning of preventive strategies in relation to the history of previous events[7]. However, incidents may eventually occur that compromise the mitigation capacity, so strategies must be constantly updated. The Guadalajara metropolitan area also has an attraction for religious tourism, which makes it comparable to other massive religious gatherings in the world[5] (Table 3).

On the other hand, this study allowed us to evaluate the preventive impact of two facts that we consider key: 1) increased training of health personnel in the management of mass medical emergencies, and 2) an increase in the number of PAMAs along the pilgrimage route, who participated in preventive activities and basic pre-hospital medical care[8,9].

The education and training of health personnel in orientation, prevention, triage, medical incident management, in addition to strengthening the communication of the emergency network and permanent surveillance by land and air (emergency medical care system helicopter), were strengths that contributed to improving attention to the risks identified[10-12].

This contrasts with the new strategies resulting from the classification of incidents and their causes that promote the relevance of local decisions. The intervention of other risk factors such as the consumption of alcohol and addictive substances are an obligatory consideration to evaluate and regulate for future events, since it is a condition that can generate violent conflicts or accidents[13,14].

An ongoing analysis in reference to the COVID-19 pandemic has been taken into account to avoid the risk of community spread of the virus. Consequently, the event could be cancelled or new virtual or remote alternatives could be proposed in the immediate future, in order to maintain a supportive social interaction without the risk of contagion[15].

One of the limitations of the study is its retrospective nature and that it does not compare actions to evaluate effectiveness. Systematic evaluation of these strategies is essential to define future actions to strengthen public health during mass events.

As conclusions of this study we can say that La Romería is one of the most important religious mass gatherings in western Mexico. Its organization and execution strategy is evaluated every year to prevent health risks and mass accidents. The preventive measures adopted, in addition to the training and participation of a greater number of health personnel, have contributed to improving its effectiveness in terms of the epidemiological risk map. However, a systematic evaluation is necessary to define updated recommendations and guidelines in the future.

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Table 3. Comparative dimension with other massive religious events in the world[1,3-5]

Festivity	Place	Year	Religion	Number of people in total	Number of People per day
Kumbha Mela	Prayagraj, Hardwar, Nasik and Ujjain (India)	2019	Hindu	> 130 millions	2,7 millions
Hach (Pilgrimage to Mecca)	Saudi Arabia	2019	Muslim	2,5 millions	2,5 millions
Pilgrimage to the Basilica of Guadalupe	City of Mexico (Mexico)	2019	Catholic	10 millions	3,3 millions
Pilgrimage of the Asunción	Lourdes (France)	2016	Catholic	6 millions	25.000 thousand
Pilgrimage of the Virgen de San Juan	San Juan de los Lagos (Mexico)	2019	Catholic	600.000 thousand	600.000 thousand
La Romería	Zapopan (Mexico)	2019	Catholic	1,8 millions	1,8 millions

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