



# MEDICAL PLANNING FOR MASS GATHERING SPORTS EVENTS IN BRAZIL

PLANEJAMENTO MÉDICO PARA EVENTOS ESPORTIVOS DE MASSA NO BRASIL

PLANIFICACIÓN MÉDICA PARA EVENTOS DEPORTIVOS MASIVOS EN BRASIL

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## ABSTRACT

**Introduction:** Medical planning for mass gathering events is founded on the structuring of assistance to the population involved and the preservation of the response capacities of the local healthcare system. Large sporting events attended by crowds are increasingly common in society. These events have been shown to be dangerous, generating higher incidences of injuries and illnesses than usual. Thus, planning and the interaction among various public and private sectors are required for the prevention of and response to emergencies and incidents involving multiple victims. **Methods:** Recently published studies on medical planning for large sports events and current federal agency legislation were selected to conduct an updated review on the subject. **Results:** After reading titles and abstracts, 159 papers were chosen for a full reading, 50 of which met the eligibility criteria and were included as the basis for this review. The size of the audience, the weather, and the behavior of the crowd seem to contribute significantly to the estimated need for resources in sporting events. **Conclusion:** Mass events require planning for prevention and to strengthen the resilience of host communities. There is still a lack of evidence that these events increase the risk of the mass spreading of disease. **Level of Evidence: V; Expert opinion.**

**Keywords:** Mass gatherings; Mass gathering medicine; Event planning; Crowding; Sports.

## RESUMO

**Introdução:** O planejamento médico para eventos de massa tem como pilares a estruturação dos atendimentos à população envolvida e a preservação da capacidade de resposta do sistema de saúde local. Grandes eventos esportivos frequentados por multidões são cada vez mais comuns na sociedade. Esses eventos têm se mostrado perigosos, gerando maiores incidências de lesões e doenças do que o habitual. Dessa forma, é necessário planejamento e interação de diversos setores, públicos e privados, para prevenção e resposta à ocorrência de emergências ou incidentes com múltiplas vítimas. **Métodos:** Foram selecionados trabalhos recentes publicados sobre o planejamento médico para grandes eventos esportivos e a legislação vigente em órgãos federais com o objetivo de realizar uma revisão atualizada sobre o assunto. **Resultados:** Após a leitura de títulos e resumos, 159 trabalhos foram escolhidos para leitura integral e 50 preencheram os critérios de elegibilidade e foram usados como base para esta revisão. O tamanho do público, as condições climáticas e o comportamento da multidão parecem contribuir significativamente para a estimativa da necessidade de recursos em eventos esportivos. **Conclusão:** Eventos de massa exigem planejamento para prevenção e fortalecimento da resiliência das comunidades anfitriãs. Ainda faltam evidências de que esses eventos aumentem o risco de propagação maciça de doenças. **Nível de evidência: V; Opinião do especialista.**

**Descritores:** Eventos de massa; Medicina dos eventos de massa; Planejamento de eventos; Aglomeração; Esportes.

## RESUMEN

**Introducción:** La planificación médica de eventos masivos tiene como pilares la estructuración de la atención a la población involucrada y la preservación de las capacidades de respuesta del sistema local de salud. Los grandes eventos deportivos a los que asisten multitudes son cada vez más comunes en la sociedad. Estos eventos han demostrado ser peligrosos, generando una mayor incidencia de lesiones y enfermedades de lo habitual. Por lo tanto, es necesaria la planificación y la interacción de diversos sectores, públicos y privados, para la prevención y respuesta a emergencias o incidentes con múltiples víctimas. **Métodos:** Se seleccionaron estudios recientes publicados sobre la planificación médica de grandes eventos deportivos y la legislación vigente en organismos federales con el objetivo de realizar una revisión actualizada sobre el tema. **Resultados:** Después de leer los títulos y resúmenes, se eligieron 159 artículos para lectura completa y 50 cumplieron los criterios de elegibilidad y se utilizaron como base para esta revisión. El tamaño del público, las condiciones climáticas y el comportamiento de la multitud parecen contribuir significativamente a la estimación de los requisitos de recursos en los eventos deportivos. **Conclusión:** Los eventos masivos requieren una planificación para la prevención y el fortalecimiento de la resiliencia de las comunidades anfitrionas. Todavía no hay pruebas de que estos eventos aumenten el riesgo de propagación masiva de enfermedades. **Nivel de Evidencia: V; Opinión experta.**

**Descriptor:** Eventos masivos; Medicina de eventos masivos; Planificación de eventos; Aglomeración; Deportes.



## INTRODUCTION

Mass events (ME) are defined as agglomerations of more than 1,000 participants, although the term is usually used for gatherings of more than 25,000 people, which generate the potential to overload the health care system of the population.<sup>1,2</sup>

Large events present dangers and risks, such as the transmission of infectious diseases, the exacerbation of pre-existing comorbidities, thermal threats, and stampedes.<sup>3,4</sup> Participants' most common complaints include respiratory problems, minor wounds, headaches, and heat-related illnesses. At sports events, specifically, the most common problems are traumatic injuries.<sup>5,6,7</sup>

Medical planning for MEs include prevention strategies, healthcare assistance, and articulations between public and private sectors.<sup>8,9</sup> Following the risk assessment, the actions depend on the healthcare surveillance systems.<sup>10</sup> Most organizers provide support at the event itself to offer early care to patients, to preserve the local healthcare system, and to provide rapid response in the event of large-scale incidents.<sup>11</sup>

The need for medical resources is mostly determined by the type and duration of the event, the weather, and the size and behavior of the crowd.<sup>12,13</sup> In Brazil, the Fan Statute regulates the minimum quantity of health professionals and Resolution no. 2012 of the Federal Council of Medicine (CFM) provides for medical organization at events, dictating the physical and material structure for public assistance.<sup>14,15</sup>

Working groups and standards have been developed in the country focused on improving preparation for these events.<sup>3</sup> History shows the importance of planning to ensure safety and good public service.<sup>16</sup> Thus, the objective of this study is to review the recent literature and the current legislation to bring together the main characteristics of medical planning for mass sports events.

## METHODS

The methodological strategy consisted of a search of the MEDLINE (Online Medical Literature Search and Analysis System), using the Pubmed server, and of the SciELO (Scientific Electronic Library Online)

database to identify studies on medical planning for mass sports events published between January 1, 2010 and December 31, 2019, written in Portuguese, Spanish, or English, with public electronic access and keyword combinations as follows: mass gatherings, mass gathering medicine, event planning, crowding, and sports.

The research period was limited to 10 years to keep up with the frequent changes to ME legislation. The publications of interest were selected by reading the title and the abstract. Publications of the World Health Organization (WHO), the International Football Federation (FIFA), federal agencies, such as the Ministry of Health (MH), National Health Surveillance Agency (ANVISA), the CFM and the relevant works cited were analyzed.

The selection criteria were discussed by two of the authors and doubtful cases were decided by a third author. Studies on medical planning for MEs of different types or specific to mass sports events were included. Studies on non-sports MEs, editorials, and letters to the editor were not included. After a full reading of the works, texts considered of little relevance for the elaboration of the review were excluded.

## RESULTS

The database search returned 1016 articles and 30 classic works from the literature were added for analysis. After eliminating the duplicates, 596 works remained, which were analyzed by reading the title and abstract. In the next step, 159 studies were selected for full readings. In the last step, 50 texts that met the eligibility criteria were chosen to serve as the basis for this study. Figure 1 presents the work selection flowchart.

Most of the excluded studies were considered irrelevant for inclusion in a review because they address the medical planning for a single event descriptively or focus on technical health, administrative, logistical, or safety aspects. The descriptive studies of mass sports events conducted in Brazil were considered more relevant and were included. Subsequently, the main rules that regulate MEs in the country were compiled and summarized.

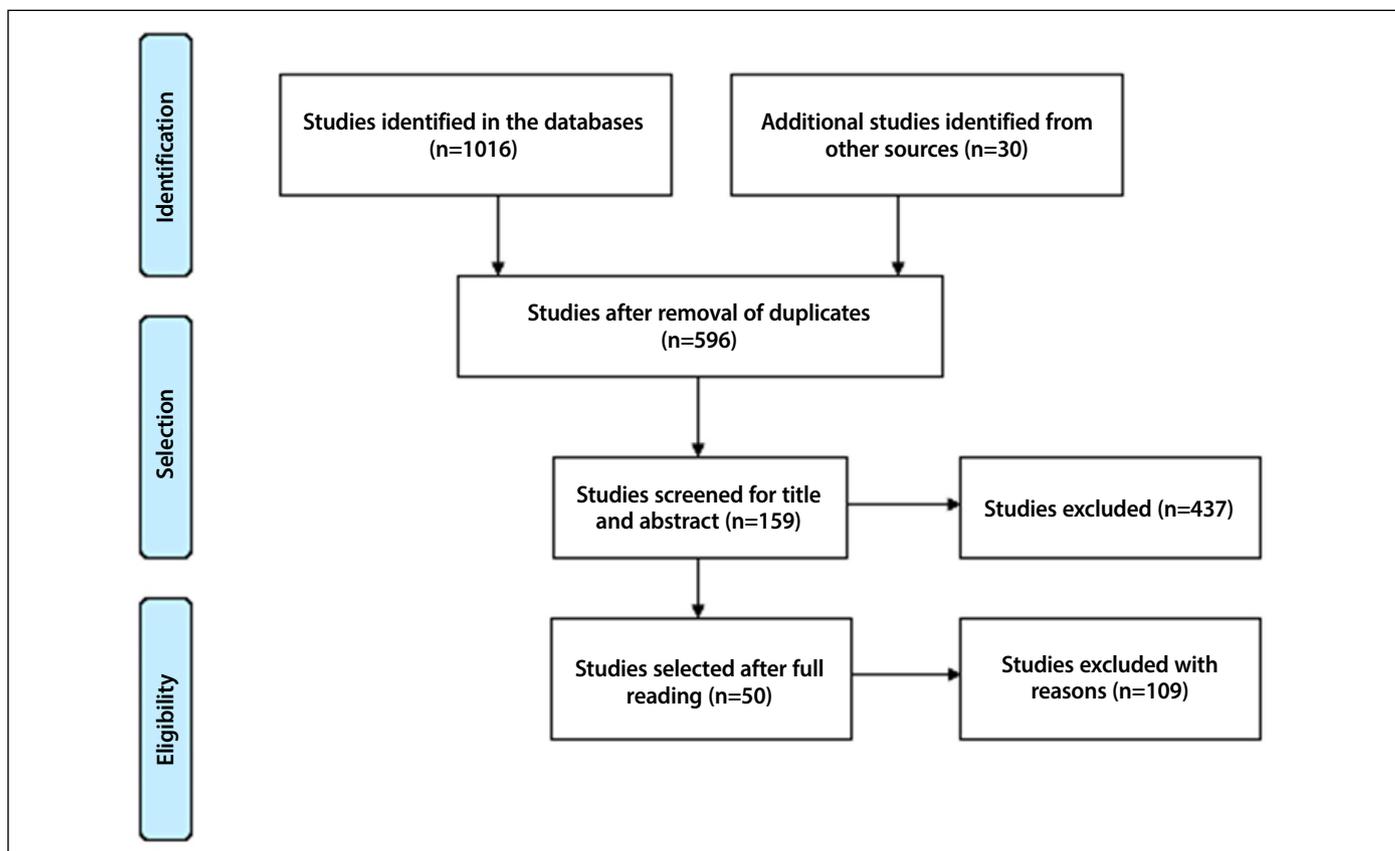


Figure 1. Study selection.

## Recent history of large sports events

While blisters, abrasions, sprains, and fractures were the main causes of medical care at the 2002 World Cup in South Korea and Japan, traveler's diarrhea, water- and/or food-borne illnesses, and sexually transmitted disease were major public health concerns at the 2004 Athens Olympics. Surveillance systems indicated that there were no major incidents at the 2009 Asian Youth Games or the 2012 London Olympics.<sup>7</sup>

Alcohol consumption was reported by 71.74% of travelers to the 2014 Soccer World Cup in Brazil and casual sex was reported by 8.76% of them. Six thousand two hundred and twenty-two (6,222) medical consultations were conducted during 64 games (97.2/game) and 167 patients were removed (2.6/game). The main complaints were headache, gastrointestinal disorders, and trauma in general.<sup>7,16</sup>

Several public health issues arose before the 2016 Rio de Janeiro Olympic and Paralympic Games, including the Zika virus outbreak, endemic dengue, and diseases transmissible in water sports. No cases of Zika were diagnosed in travelers and the incidence of diarrhea among those exposed to contaminated water did not increase.<sup>4</sup>

As of the completion of this review, no public health incidents had been reported for the 2018 World Cup in Russia. Awareness of the danger of infectious diseases increased as local hospitals reported high rates of bacteria resistant to broad-spectrum antibiotics.<sup>4</sup>

## Risk assessment

The main dangers and risks related to MEs are transmission of infectious diseases, health problems related to food and water, exacerbation of comorbidities, mental and psychosocial disorders, hyperthermia, dehydration, and sunburn, trampling, crushing, trauma in general, alcohol/drug abuse, and terrorist attacks.<sup>4</sup>

It is recommended that risk assessments be conducted before an ME. The WHO divides this process into identification of event hazards, including the demographic characteristics, environmental and access conditions, prevalent diseases, and political interests; characterization of threats and vulnerabilities, prioritizing those that require planning; and definition of the measures to mitigate them. The international community developed the ISO/DIS 31000 model to ensure the efficiency and consistency of the process, accessible at [www.iso.org/iso/home/standards/iso31000.htm](http://www.iso.org/iso/home/standards/iso31000.htm). Planning requires compliance with the 2005 International Health Regulations.<sup>2</sup>

The International Football Federation (FIFA) also developed its own model in 2010, focused on the World Cup in South Africa and based on the United Kingdom Health and Safety Guide for Music and Similar Events.<sup>17,18</sup> This tool was subsequently validated internationally and has been used as a reference for FIFA events.<sup>19</sup>

## Non-communicable risks

Stampedes and thermal threats are the main causes of death at MEs. Between 1980 and 2007, 215 stampedes resulted in more than 7,000 deaths and 14,000 injuries. At the 1996 Olympics in Atlanta, in the United States, more than 1000 people were treated for heat-related issues.<sup>20</sup>

The incidence of cardiovascular disease at mass sports events can increase as stress triggers neuroendocrine responses leading to increases in heart rate, peripheral vascular resistance, and blood pressure. During the 2006 World Cup in Germany, the incidence of cardiovascular emergencies was 2.66 times higher than during the control period. Cardiopulmonary arrests (CPA) are rare at sports events.<sup>21</sup>

## Communicable risks

Several factors influence the spread of infectious diseases at MEs, including seasonal or endemic pathogens in the host community, pathogens endemic to the visitor communities, and the way in which people

interact. Syndromic and laboratorial surveillance have been suggested as components of ME healthcare systems, especially in countries that do not have well-structured systems.<sup>10</sup>

In 2014, Gallego et al. identified diseases transmitted by insects, respiratory pathogens, and food/water as the main risk factors for visitors to Brazil for the World Cup and Olympic Games.<sup>22</sup> That same year, Gaines et al. suggested that visitors receive orientation about travel medicine at least four weeks before the competitions, including vaccination, traveler's diarrhea, skin parasites, and risky behaviors.<sup>23</sup>

The impacts of infectious diseases on MEs were initially noted for transmission through food and water, but rare outbreaks of other diseases have occurred internationally. Small measles outbreaks occurred at the 1991 Special Olympics in Minneapolis, in the United States, and at smaller events. An outbreak of leptospirosis was identified at the 2000 Eco-Challenge-Sabah in Borneo, and participants in the 2002 Winter Olympics in Salt Lake City, in the United States, were involved in an outbreak of influenza.<sup>24,25</sup>

In 2009, Zieliński published an important review on the transmission of infectious diseases at large events, including the Summer and Winter Olympics held from 1984 to 2008, the Football World Cups from 1998 to 2006, and the Football Eurocups from 2000 to 2008. The author concluded that there was a lack of convincing evidence that sports events increase the risk of mass disease propagation, mainly due to the existence of well-defined health protocols.<sup>26</sup> Table 1 describes the main dangers and risks of mass sports events.

## Medical assistance at events

The patient assistance rate (PAR) is defined by the number of people per thousand at an event that require medical attention, generally ranging from 0.5 to 2.6 per event. The transportation-to-hospital rate at MEs is approximately 0.027/1000 participants.<sup>5</sup>

Approximately 75% of the complaints are due to respiratory problems, bruises, abrasions, headache, hyperthermia, sunburn, blisters, and insect bites.<sup>6</sup> At sports events in particular, the PAR can reach values of between 30 and 180 participants per thousand. Traumatic injuries are the most common problems, especially low back pain and bruises.<sup>7,27</sup>

Many authors indicate that the size of the crowd and the weather are the main determinants of the PAR.<sup>28-31</sup> Higher rates are seen at multiple-day events and those with possible alcohol and drug abuse. The mood of the crowd is another significant variable, affected by team rivalry and the strong emotional component of competitions.<sup>28,32</sup> In their extensive 2002 review, Milsten et al.<sup>12</sup> concluded that multiple inter-related variables influence the PAR.

Several methods and models are used to predict resource needs for MEs. The Zeitz method<sup>33</sup> estimates the volume of cases requiring medical attention at an event that is repeated periodically by analyzing historical data. The Arbon method<sup>1</sup> is a statistical model that considers environmental factors, physical barriers, and crowd mobility. The Hartman model is based on weather, alcohol consumption, and the number and mood of the participants.<sup>34</sup>

Most studies on MEs are descriptive and few have analyzed multiple events to establish relations between the PAR and causal factors. There is no standardization in the collection and analysis of medical care data,

**Table 1.** Dangers and risks of large sports events.

Dangers and Risks
Traumas in general
Transmission of infectious diseases
Alcohol abuse
Exacerbation of pre-existing diseases
Thermal threats
Trampling and crushing
Terrorist attacks

even though there is significant effort at the international level, making it difficult to accumulate greater knowledge on the subject.<sup>5,35-37</sup>

The most common health services format centralizes the resources at medical posts, combined with dispersed mobile teams and small internal transport vehicles. Due to the congestion associated with MEs, local authorities are usually to assist in the evacuation of ambulances.<sup>6</sup>

A standard of quality is suggested rather than a minimum amount of resources: first aid and basic support within four minutes, advanced support within 8 minutes, and removal within 30 minutes.<sup>38</sup> In 2011, Borjesson et al. stated that the minimal acceptable standard was basic support with automated external defibrillators (AED) within a maximum of five minutes.<sup>39</sup> In 1995, Parrillo advocated the involvement of physicians in ME planning due to their complexity and unpredictability.<sup>40</sup>

### Disasters and multiple victim incidents (MVI)

Major incidents occur periodically at MEs. In 1989, during a football match in Sheffield, England, 96 fans were killed and 766 were injured, crushed, or trampled due to failures in crowd control. At the 1996 Olympic Games in Atlanta, in the United States, 111 people were wounded when a bomb exploded. In 2001, 47 people were trampled to death in a South African stadium during a stampede. A bomb explosion from the terrorist attack at the 2013 Boston Marathon killed 3 people and wounded 264.<sup>44,41</sup>

In 2012, Soomaroo and Murray identified failures in crowd control, in access, in fire safety measures, medical preparation, and emergency response as the key factors in the history of disasters.<sup>41</sup> In 2014, Turrís et al. showed that the most common injury mechanisms involve movement under overcrowded conditions.<sup>42</sup>

In health planning for the 2014 Brazil World Cup, studies showed that only 51% of hospitals had plans to increase capacity in the case of MVIs, 34% received training from the authorities, and 27% had the structure to isolate patients. Increases in demand caused by traumas and infectious diseases were the main concerns in view of the shortage of beds, especially in the public network.<sup>43,44</sup>

In 2015, Woodward et al.<sup>45</sup> advised medical organizers of sports events on disaster planning and emphasized that there are no mandatory requirements. This decision lies with the physician responsible and is based on their experience and on the resources available.

In their 2002 review of MVIs at sports events, Delaney and Drummond<sup>46</sup> defined activation of emergency services, scene safety, screening, initial treatment, and rescreening as priorities. The professionals involved must immediately activate the disaster plan upon perceiving resource limitations. After ensuring scene safety, patients must be screened. Initial treatment involves only basic measures such as the opening of airways and compression to stop bleeds. The first screening is not precise and must be repeated periodically.

Most specialists indicate the START (simple triage and rapid treatment) method as the best screening tool. The system assesses respiration, perfusion, and mental status. Colors are used to classify the severity and to guide the handling of victims, separating them into green – able to walk and must leave the location, yellow – can wait a few hours, red – needs immediate treatment, and black – dead or with wounds incompatible with life.<sup>46</sup>

### Legislation

Even though large organizations and institutions have their own guides, minimum standards are established by the authorities. The main rules that regulate healthcare services at MEs in Brazil, which were in force at the conclusion of this study, are presented below.

Health Ministry Ordinance no. 2048 of November 5, 2002, which approves the Technical Regulation of State Urgency and Emergency Systems<sup>47</sup> and Federal Medical Council Resolution no. 1671 of July 9,

2003, which provides for the Regulation of Pre-Hospital Care (PHC),<sup>48</sup> define, among others, the rules for ambulances, including their types, minimum crew, materials, medications, and equipment necessary for PHC.

Law no. 10671 of May 15, 2003,<sup>14</sup> known as the Fan Defense Statute, determines that sports event organizers must provide at least one doctor, two standard nurses, and an ambulance for every 10,000 fans, in addition to informing health authorities about the event in advance. Sanitary surveillance will confirm compliance with the law and will ensure the hygiene and quality of the physical facilities and the food.

According to Presidential Decree no. 7616 of November 17, 2011,<sup>49</sup> disasters are public health emergencies of national concern (ESPIN), and the National Force of the Unified Health System (FN-SUS) was established for their prevention and assistance. Disasters are emergencies or states of public calamity recognized by the Federal Executive Branch, implying direct Health Ministry involvement.

CFM Resolution No. 2012 of February 22, 2013<sup>15</sup> provides for the medical organization of events, disciplining the physical and material structure for public assistance, and for the actions of foreign physicians accompanying their delegations in Brazil. The entities that organize sports events, which need to guarantee medical assistance, must have their own or an outsourced service. The assistance follows the proposed inspection protocol, including, among others, a physical medical post or field post, a procedure room, first aid and life support materials, and an advanced-support ambulance.

ANVISA Collegiate Board Resolution no. 13 of March 28, 2014<sup>50</sup> regulates the provision of health services of national interest. The evaluation, inspection, and monitoring of health services at events are the responsibility of local health surveillance, complemented by ANVISA. The event organizer is responsible for providing urgent and emergency health services, infrastructure, human resources, equipment and materials, and the removal of critical patients to more complex services.

Health Ministry Consolidation Ordinance no. 5 of September 28, 2017<sup>8</sup> defines, within the scope of SUS, management responsibilities and establishes the National Guidelines for the Planning, Execution, and Evaluation of ME Surveillance and Health Assistance (origin: Health Ministry Ordinance no. 1139/3012). The sanitary authorities must evaluate and approve the prevention, risk mitigation, and health service provisions for events. ANVISA will regulate the responsibilities of the organizer and coordination of the actions is the responsibility of the municipal authorities, in partnership with the states and the Ministry of Health when estimating their capabilities. The risk assessment must include the factors and criteria described in this ordinance. Table 2 summarizes the main rules that regulate MEs in Brazil.

**Table 2.** Main Sporting event regulations.

Epigraph	Summary
Health Ministry Ordinance nº 2048 - 2002	Approves the Technical Regulation of State Urgency and Emergency Systems
CFM Resolution no. 1671 - 2003	Provides for the Regulation of Pre-Hospital Care
Federal Law no. 10671 - 2003	Provides for the Fan Defense Statute and other provisions
Presidential Decree no. 7616 - 2011	Provides for the declaration of ESPIN and establishes the FN-SUS
CFM Resolution no. 2012 - 2013	Provides for the medical organization of events, disciplining the physical and material structure for public assistance
ANVISA Collegiate Board Resolution no. 13 - 2014	Regulates the provision of health services of national interest
Health Ministry Consolidation Ordinance no. 5 - 2017	Defines the management responsibilities and establishes the National Guidelines for the Planning, Execution, and Evaluation of ME Surveillance and Health Assistance

## DISCUSSION

Agglomerations of people at events, possibly carrying diseases and subject to MVIs, represent threats to public health. On the other hand, MEs create opportunities for society to benefit from positive effects, such as the strengthening of the public health system and economic development.<sup>3,5,8,27</sup>

Prior to the event, action plans are prepared by the responsible physicians and public health and safety authorities, and the necessary interagency relationships are established according to the risks and the available resources. The event itself involves real-time response and monitoring of medical care. After the event the analysis of services provided is conducted, which will assist in planning future events.<sup>11,51,52</sup>

In the model created by FIFA, the variables were adjusted to realistically reflect what developing countries can offer. This is an important point given that most models were prepared for developed countries with an abundance of resources. Thus, this tool warrants attention and further testing, including its application to different sports modalities.<sup>18,19</sup>

Research indicates that the creation of risk assessment tools and legacy projects are the future perspectives for MEs. In 2020, the WHO published a risk assessment tool for sports events in the context of the COVID-19 pandemic. The content can be accessed via the portal at <https://www.who.int/publications/i/item/10665-333187>.

### Non-communicable diseases, epidemics, and pandemics

The history of MEs indicates that adequate crowd management is mandatory. To minimize heat-related problems, providing easily accessible locations for hydration, cooling, and guidance about protective equipment is recommended.<sup>20,43</sup>

Given that acute mental stress can increase the risk of negative cardiovascular outcomes, foods high in fat and/or salt, alcohol, cigarettes, and intense physical exercise should be avoided during sports events.<sup>6,21</sup>

Large agglomerations increase the risk of spreading pathogens creating disease prevention challenges. Collective transportation presents a high risk of the spread of respiratory diseases. Overcrowded places are conducive to the spread of respiratory diseases and places where alcohol is available encourage risky behaviors.<sup>10</sup>

The studies analyzed suggest that communities without efficient diagnostic and notification systems adopt syndromic surveillance models, reducing the chances of underreporting. Another alternative is the creation of surveillance systems in the form of sentinel units, providing broad coverage of the population.<sup>53,54</sup>

In December 2019, the first case of COVID-19 was reported in Wuhan, China. On March 11, 2020, after it had spread rapidly around the world, the WHO declared the SARS-CoV-2 pandemic. On March 13, 2020, the Brazilian Ministry of Health recommended the postponement or cancellation of MEs indefinitely. At the time of completion of this work, many studies on the impacts of the disease, the elaboration of norms, and experiments with the public around the world were ongoing.

### Medical assistance at events and for major incidents

At sports events, the PAR can reach extremely high values with a change in the pattern of complaints. This large variation is due, in part, to different data collection methodologies and to the type of public. The inclusion of service providers and athletes, especially in endurance challenges is common.<sup>6,7,27</sup>

Many studies have pointed out that the PAR tends to decrease with a significant increase in the number of participants. It is

assumed that, when it becomes more difficult to access health services, participants tend to forgo or postpone treatment for simple complaints.<sup>30,55</sup>

Although some authors have shown a linear relationship between temperature and the PAR, in 2010, Baird et al. demonstrated a directly proportional relationship between the thermal index, which combines temperature and humidity, and the PAR.<sup>56</sup> Apparently, this variable is the most promising for new predictive models. As attendees of sports events are usually younger than those who attend other events, risky behaviors, such as fighting and alcohol abuse, are more prevalent, increasing the rate of medical attendance.<sup>28,32,57</sup>

The literature indicates that no model is used universally. Federal, state, and municipal guidelines also exist, but many were developed prior to important systematic investigations and need to be updated. Resource estimates should, whenever possible, use historical data from the same event or from events similar in type and size.<sup>1,6,20</sup>

While some models suggest that only nurses and first responders perform treatment, others recommend that physicians evaluate all patients. High-risk events must have physicians on the front line for screening, chain of command, and to assist the support agencies. All supply lists must, at a minimum, make AEDs, airway access materials, and immobilization devices available.<sup>6,40</sup>

The history of major incidents indicates that training security teams in crowd control and fire evacuation plans is essential. Workers must be regularly trained on their own facilities.<sup>4,41,42</sup>

In pre-hospital planning, actions must follow decontamination, screening, initial treatment, and removal protocols, when necessary. Communication among those responsible at the site of the incident, during hospital care, and within the national department involved ensures that all needs are met.<sup>3</sup>

The hospital phase must integrate the agencies involved, security, human resources, logistics, and supplies, including medications, hospital materials, blood banks, individual protection equipment, and radiation detectors. Plans for interruptions of electricity, water, and medical gases are necessary. When the demands surpass the local capacities, a regional response should be prepared, bases near the incident must be established, national and/or international cooperation must be requested, and a mass communication plan must be created.<sup>3</sup>

Situational awareness is essential for handling MVIs. The qualifications of the professionals and the local emergency services should be known, and they should be notified of the event in advance. It is suggested that meeting points for the rescue teams be established, and multiple means of communication be used. Mobile telephony can be unstable and radio communication is recommended. Reliable methods for delivering instructions, such as speakers or megaphones, are also critical.<sup>45</sup>

### Norms

The regulatory norms for medical services at MEs have been presented in summary as they are extensive and often contradictory or obsolete, requiring constant updates. The references pertain to the medical organizers of sport events. The evaluation of planning and inspection by the local health authorities is mandatory prior to holding the ME. The entire set of regulations, including the roadmap for the physical and material inspection of the structures for public assistance and the risk assessment criteria, can be found in editions of the Official Gazette, on the CFM portals, or in the Virtual Health Library of the Ministry of Health and the Federal Government, according to the references.

## Limitations

Despite a rigorous and reproducible research strategy, there is a risk that these results were impacted by selection bias. The research was restricted to studies published in English, Portuguese, and Spanish, to a period of 10 years, and to classic works. In general, the quality of the studies analyzed is poor. The interdisciplinary nature of MEs makes it difficult to dig deep into relevant topics such as risk management, health surveillance, and legislation.

## CONCLUSIONS

Mass events require multi-sector planning for prevention and to strengthen the host communities' response capacity. There is a lack of consistent evidence that sports events increase the risk of mass propagation of communicable diseases.

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