

2014 FIFA World Cup Brazil: active surveillance and profile of health care in the host city of Fortaleza, Ceará, Brazil

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Abstract

Objective: to describe the real-time active surveillance strategy and the profile of health care provided during the 20th FIFA World Cup Brazil 2014 (FWCB), in the host city of Fortaleza, Ceará, Brazil. **Methods:** this was a descriptive study with data collected from medical records during the FWCB, between June 8 and July 13, 2014, in pre-selected health care units. **Results:** there were 2,570 medical assistances related to the FWCB; 56% of the patients were male, 35% were between 20 and 29 years old; 68% were clinical care, and 64% of the individuals were fans/spectators; 94% of the patients were discharged, 3% were referred, 3% were hospitalized and 0.2% died; the advanced medical units were responsible for 79% of the assistances, mainly on game days. **Conclusion:** no public health event of great importance was identified; the active surveillance strategy enabled the monitoring of health situation of those individuals involved in the event.

Key words: Public Health Surveillance; Soccer; Epidemiology, Descriptive.

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Introduction

A mass gathering event is any event that involves a great number of individuals, in a specific place, period and for a reason, which can be related to sports, culture or religion. Agglomerations may lead to the introduction and spread of diseases, with a possibility of increasing the demand for health services; thus, it is essential to carry on action plans for the health system.¹⁻⁴

FIFA World Cup is the second biggest sports event in the world. The competition between the best soccer teams of the world takes place every four years and pulls together people from all continents and cultures. The previous editions of the event had taken place in Germany (2006) and South Africa (2010).^{5,6} The 20th edition of FIFA World Cup (FWCB) took place in Brazil, in 2014, and this was the second time the country has hosted this event; the first time was in 1950.⁷ The competition happened from 12 June to 13 July, 2014 with the participation of 32 teams. The matches took place in twelve host cities: Belo Horizonte, Brasília, Cuiabá, Curitiba, Fortaleza, Manaus, Natal, Porto Alegre, Recife, Rio de Janeiro, Salvador and São Paulo.⁸

Agglomerations may lead to the introduction and spread of diseases, with a possibility of increasing the demand for health services; thus, it is essential to carry on action plans for the health system.

The FWCB brought many challenges to the country, given its size and the diversity of participants. This event presented potential to spread communicable diseases, possible threaten of accidents with various victims, terrorist attacks with chemical, biological, radiological, nuclear and explosive products (CBRNE), isolated cases or outbreaks. The challenges were not only related to control measures, but also included the timely detection and management of infectious diseases in the local population and travelers who would return to their countries of residence.^{3,4,7,8}

In Fortaleza, there were a total of six matches, on 4, 17, 21, 24 and 29 June and 4 July, 2014, with an average of 59,483 fans at the Castelão Arena; the record of fans was registered on 17 June and 4 July, with more than 60 thousand spectators in the stadium, each day.

There was a high mobilization in order to promote a safe mass gathering event for all the visitors traveling throughout the country during the FWCB.^{7,9,10}

The objective of this study was to describe the real-time active surveillance strategy and the profile of the health care provided during the 20th FIFA World Cup Brazil 2014, in the host city of Fortaleza, Ceará, Brazil.

Methods

This was a descriptive study. To describe the strategy of real-time active surveillance, we used data on the reports produced by the supervisors of the State Health Department of Ceará and of the Ministry of Health. To identify possible changes in the epidemiological profile of diseases and health conditions, secondary data collected by the active surveillance was used.

In 2014, Fortaleza had 2,571,896 inhabitants and was the 5th most populous capital city in Brazil, according to estimates of the Brazilian Institute of Geography and Statistics (IBGE).¹¹ Fortaleza hosted the FWCB matches from 8 June to 13 July, 2014.

The State Health Department of Ceará and the Municipal Health Department of Fortaleza settled the Center for Integrated Health Operation (CIOCS/CE), which aimed to centralize the control and monitoring of the actions from 8 June to 25 July, 2014. The CIOCS/CE was composed by staff of both health departments, represented by the areas of Primary Health Care, Health Promotion, Health Surveillance, Workers' Health, Emergency Mobile Care Service (SAMU), Central Public Health Laboratory (Lacen/CE) and Press Office, besides counting with the support of logistics and information technicians.

The CIOCS/CE worked as a situation room that ensured the flow of strategic information between the various local sectors and the National Center for Integrated Health Operation (CICCN), of the Federal Government.⁷ The actions enabled data collection and register.

The definition of health care considered here was: individuals who went to any pre-determined health care facility, in order to receive any kind of health assistance related to the event.

The variables studied were: sex (male or female); date of health care; age group (in years: ≤1; 1 to 4; 5 to 9; 10 to 14; 15 to 19; 20 to 29; 30 to 39; 40 to 49; 50 to 59; 60 to 69; 70 to 79; ≥80; unknown); type of health care facility (public or private); relation with the event (fan/spectator; FIFA employee; hired or volunteer;

press; police officer/security guard; protester; others); type of health care (trauma [accident or violence] or clinical); evolution (discharge; referral; hospitalization; death); country of residence; and syndromic approach (diarrhea; respiratory; exanthematous).

The risk classification, when performed, took place during admission and was based on Manchester Protocol, which works with algorithms associated to waiting time and is represented by a colors scale. For the event, the colors were standardized according to the risk: green (low risk); yellow (moderate risk); red (high risk); black (death).

The resolvability of the health care was calculated by the proportion of patients assisted, except referrals, in relation to the total of care conducted in Castelão and FIFA FanFest (FFF) arenas. The assistance rate was calculated by the number of health care provided divided by the estimate audience and multiplied by one thousand, for both arenas.

This study was conducted with secondary data, available through the State Health Department, collected and analyzed in the services routine of the epidemiological surveillance, ensuring the confidentiality and anonymity of individuals, according to the Resolution of the National Health Council (CNS) No. 466, dated 12 December, 2012.

Results

Active Surveillance Strategy

For the assistances related to the FWCB in Fortaleza, 20 health facilities were selected: 11 hospitals, 3 emergency care units and 6 advanced medical units (AMU), a total of 17 public units (12 municipal and 5 state) and 3 private units.

The AMU were provisory facilities, equipped to attend to the demand of the FWCB and avoid overcrowding the municipal health care. Two AMU were installed at the FFF Arena. They worked from 8 June to 13 July, 2014, during the shows and games broadcasting. Other two AMU were adapted inside two primary health care units, located close to the Castelão Arena, and worked only on game days at Castelão. All these units counted with two *SAMU* ambulances (one basic and one advanced). The unit outside Castelão Arena also counted with one sealed ambulance for cases of CBRNE victims.

Three Emergency Care Units (ECU), strategically located, were selected: one at Praia do Futuro and two close to Castelão Arena.

Of the 20 facilities selected and equipped to collect data, 10 used online (connected, in real time) mobile devices (tablets); being 3 AMU, 3 ECU and 4 hospitals (2 public and 2 private), and were responsible for a total of 1,479 (57.6%) records. The other 10 units, of which 9 were public hospitals, collected the health care data in a traditional form, using desktops or notebooks for 161 (6.3%) records; the unit inside Castelão typed its data at *CIOCS/CE* and accounted for 930 (36.2%) records.

In the health units that used tablets, data was inserted by 13 volunteers: 10 actives and 3 substitutes for days off. Data was sent online from these devices to the central database of *CIOCS/CE*. In the units that used the conventional recording, data was typed by state or municipal public employees and sent, by e-mail, to be added on *CIOCS/CE* database.

For the health care performed at Castelão Arena the strategy adopted was different, because FIFA did not allow the entrance in the Arena with tablets. Thus, at the end of each match, the files were typed by the technicians on duty at *CIOCS/CE* headquarter.

The real-time monitoring was conducted by a multi-professional and inter-institutional team, composed by IT professionals, epidemiologists, doctors, nurses, administrative staff and field supervisors. The supervision team was responsible for monitoring the data feeding, escort the collecting team, and give technical support to equipment and data sending. The strategy was supported by the Ministry of Health, the Centers for Disease Control and Prevention (CDC) of the United States of America and the South American Network for Field Epidemiology (*REDSUR*), through the Training Programs in Epidemiology and Public Health Interventions Network (*TEPHINET*).

All the mobile devices used worked well, and did not present any major problems that could impair the activities. In the period, 2,341 Mbytes of mobile data were used to send the data through the Epi Info™ application, developed for Android platforms.

All the data was processed at *CIOCS/CE* with the softwares Microsoft Office Excel, Epi Info™ version 7.1.3.10, for data tabulation and analysis; the SQL Server Management Studio was used for data exporting and handling.

In order to complement the strategy of active surveillance and the real-time monitoring of health care during the FWCB, the *CIOCS/CE* used the panel analysis strategy, enabling quicker monitoring and decision making by health managers.

Three panels were built with Epi Info™, with pre-tabled and updated analyses, for the insertion of new data; two panels were specific for routine actions and one was used for syndromic approach.

Among the specific panels, one was named TOTAL, showing 10 analyses with the description of health care per country of residence, other countries, type of health care facility, epidemic curve, age group, type of health care, type of accident/violence, relation with the event, evolution and risk classification; the other specific panel, named DAILY, filtered with the date, presented all the data of the TOTAL panel, except for the epidemic curve.

Another monitoring form was the syndromic approach, built from the following definitions for cases of diarrhea, respiratory and exanthematous syndromes:

- a) Diarrhea – Patients assisted with diarrhea + nausea + vomiting; or diarrhea plus one of the following symptoms: nausea, vomiting or fever.
- b) Respiratory – Patients assisted with exanthema, fever, headache and cough; or with exanthema, fever and headache.
- b) Exanthematous – Patients assisted with exanthema, fever, cough and sore throat; or with fever and cough or sore throat.

Profile of health care

From 8 June to 13 July 2014, there were 2,570 health care related to the FWCB in Fortaleza. Among the patients assisted, 55.5% were male and 35.1% were in the 20-29 age group; 68.4% of the health care were clinical – including those due to heavy drinking – and 31.6% were due to traumas (Table 1).

Among the 812 trauma records, 19.6% were falls, 10.6% were aggressions, 10.5% were transport accidents and 8.0% were burns; besides the trauma records, 51.3% of the health care were due to other accidents/violence (Table 1).

According to the risk classification in health care, 78.2% were green, 14.7% were yellow, 1.7% was red and 0.1% was black; 3.3% did not have risk classification and 2.0% did not fill this variable (Table 1).

With regard to the event, 64.4% were fans/spectators and 33.6% were workers. Most of the health care was to Brazilians (84.3%), 3.4% to Mexicans, 1.6% to North Americans (USA), 1.5% to Germans, 0.9% to Uruguayans, 0.8% to Colombians and 0.8% to French (Table 1).

Concerning the evolution, 94.1% of the patients were discharged, 3.2% were referred, 2.5% were hospitalized

and 0.2% died. Most of the records occurred on game days in Fortaleza (Figure 1).

Among the 2,540 health care recorded with at least one clinical complaint, 19.7% reported headache, 7.7% malaise, 6.7% nausea, 5.7% abdominal pain and 4.6% vomiting (Table 1).

With regard to the type of health care facility, 79.0% of the health care took place at the AMU, 15.3% in hospitals and 5.7% at the ECU.

When comparing the number of hospitalizations in June and July 2014 with the same period from 2010 to 2014, we could not observe major differences (Figure 2). Although July 2014 has exceeded the hospitalization average, the same fact could be observed in July 2013, during the Confederation Cup.

Among the four advanced medical units of Castelão Arena, there were 1,129 health care; 51.0% of the assisted patients were male individuals, 35.6% were aged between 20 and 29, 76.4% were clinical care and 23.6% were trauma care. Of the 264 trauma patients, 14.4% were due to falls, 2.6% due to aggression, 8.0% due to burns and 1.5% due to transport accidents, and the other 73.5% were due to other accidents/violence (Table 1).

Concerning the relation with the event, 52.2% of the patients assisted exclusively at the Castelão Arena were fans/spectators, 46.5% were workers and 1.3%, others. With regard to risk classification, 94.0% were green, 5.7% were yellow, 0.3% red and no death was registered. Among the patients, 83.8% were Brazilians, 2.6% were Mexicans and 1.6% were North Americans (USA). Concerning evolution for the patients assisted at Castelão Arena, 98.0% were discharged, and 2.0% were referred, representing a resolutivity of 98.0% (Table 1).

At the advanced medical units built at FIFA FanFest, there were 901 health care. From this total, 50.5% of the patients were male, 35.6% aged from 20 to 29, 78.0% received clinical care and 22.0% received trauma care. Among the 198 trauma cases, 20.2% were assisted due to falls, 14.6% due to aggressions, 3.0% due to burns and 3.0% due to transport accidents, other 59.1% were due to other accidents/violence (Table 1).

At the FFE, 62.9% of the patients were fans/spectators, 36.1% were workers and 1.0% were others. Concerning risk classification, 92.5% were green, 7.3% were yellow, 0.2% was red and there was no black. With regard to nationality, 89.5% were Brazilians, 2.9% were Mexicans and 1.1% were North Americans (USA). The

Table 1 – Profile of health care performed during the 20th FIFA World Cup Brasil in the host city of Fortaleza-CE, June-July 2014

| Variables | Place of health care | | | | | | | |
|--------------------------------|-------------------------------|------|----------------------------------|------|----------------|------|-------------------|------|
| | Urgency and Emergency Network | | FIFA ^a Fan Fest Arena | | Castelão Arena | | Total health care | |
| | N=540 | % | N=901 | % | N=1,129 | % | N=2,570 | % |
| Sex | | | | | | | | |
| Male | 395 | 73.2 | 455 | 50.5 | 576 | 51.0 | 1,426 | 55.5 |
| Female | 145 | 26.8 | 446 | 49.5 | 553 | 49.0 | 1,144 | 44.5 |
| Age group (in years) | | | | | | | | |
| ≤1 | 1 | 0.2 | – | – | 1 | 0.1 | 2 | 0.1 |
| 1-4 | 7 | 1.3 | 5 | 0.6 | 5 | 0.4 | 17 | 0.7 |
| 5-9 | 9 | 1.7 | 12 | 1.3 | 17 | 1.5 | 38 | 1.5 |
| 10-14 | 21 | 3.9 | 28 | 3.1 | 21 | 1.9 | 70 | 2.7 |
| 15-19 | 55 | 10.2 | 137 | 15.2 | 73 | 6.5 | 265 | 10.3 |
| 20-29 | 180 | 33.3 | 321 | 35.6 | 402 | 35.6 | 903 | 35.1 |
| 30-39 | 123 | 22.8 | 198 | 22.0 | 296 | 26.2 | 617 | 24.0 |
| 40-49 | 83 | 15.4 | 114 | 12.7 | 158 | 14.0 | 355 | 13.8 |
| 50-59 | 34 | 6.3 | 51 | 5.6 | 68 | 6.0 | 153 | 6.0 |
| 60-69 | 16 | 2.9 | 24 | 2.7 | 42 | 3.7 | 82 | 3.2 |
| 70-79 | 8 | 1.5 | 4 | 0.4 | 8 | 0.7 | 20 | 0.8 |
| ≥80 | 3 | 0.5 | 2 | 0.2 | 1 | 0.1 | 6 | 0.2 |
| Unknown | – | – | 5 | 0.6 | 37 | 3.3 | 42 | 1.6 |
| Relation with the event | | | | | | | | |
| Fan/spectator | 498 | 92.2 | 567 | 62.9 | 589 | 52.2 | 1,654 | 64.4 |
| Worker | 14 | 2.6 | 325 | 36.1 | 525 | 46.5 | 864 | 33.6 |
| Others | 28 | 5.2 | 9 | 1.0 | 15 | 1.3 | 52 | 2.0 |
| Risk classification | | | | | | | | |
| Green | 117 | 21.7 | 833 | 92.5 | 1,061 | 94 | 2,011 | 78.2 |
| Yellow | 247 | 45.7 | 66 | 7.3 | 64 | 5.7 | 377 | 14.7 |
| Red | 38 | 7.0 | 2 | 0.2 | 4 | 0.3 | 44 | 1.7 |
| Black | 2 | 0.4 | – | – | – | – | 2 | 0.1 |
| Without risk classification | 85 | 15.7 | – | – | – | – | 85 | 3.3 |
| No filling | 51 | 9.4 | – | – | – | – | 51 | 2.0 |
| Country of residence | | | | | | | | |
| Brazil | 415 | 76.9 | 806 | 89.5 | 946 | 83.8 | 2,167 | 84.3 |
| Mexico | 32 | 5.9 | 26 | 2.9 | 29 | 2.6 | 87 | 3.4 |
| United States of America | 13 | 2.4 | 10 | 1.1 | 18 | 1.6 | 41 | 1.6 |
| Germany | 16 | 3.0 | 7 | 0.8 | 16 | 1.4 | 39 | 1.5 |
| Uruguay | 5 | 0.9 | 6 | 0.7 | 12 | 1.1 | 23 | 0.9 |
| Colombia | 6 | 1.1 | 5 | 0.6 | 9 | 0.8 | 20 | 0.8 |
| France | 3 | 0.5 | 2 | 0.2 | 15 | 1.3 | 20 | 0.8 |
| England | 2 | 0.4 | 5 | 0.6 | 6 | 0.5 | 13 | 0.5 |
| Australia | 5 | 0.9 | 4 | 0.4 | 3 | 0.3 | 12 | 0.5 |
| Holland | 2 | 0.4 | 2 | 0.2 | 7 | 0.6 | 11 | 0.4 |
| Others ^b | 29 | 5.4 | 25 | 2.8 | 34 | 3.0 | 88 | 3.4 |
| Not informed | 12 | 2.2 | 3 | 0.3 | 34 | 3.0 | 49 | 1.9 |

Continue on next page

Table 1 – Conclusion

| Variables | Place of health care | | | | | | | |
|--------------------------------|-------------------------------|------|----------------------------------|------|----------------|------|-------------------|------|
| | Urgency and Emergency Network | | FIFA ^a Fan Fest Arena | | Castelão Arena | | Total health care | |
| | N=540 | % | N=901 | % | N=1,129 | % | N=2,570 | % |
| Evolution | | | | | | | | |
| Discharge | 442 | 81.9 | 869 | 96.5 | 1,106 | 98 | 2,417 | 94.1 |
| Referral | 28 | 5.2 | 32 | 3.6 | 23 | 2.0 | 83 | 3.2 |
| Hospitalization | 64 | 11.9 | – | – | – | – | 64 | 2.5 |
| Death | 6 | 1.1 | – | – | – | – | 6 | 0.2 |
| Clinical Findings | | | | | | | | |
| Headache | 36 | 6.7 | 163 | 18.1 | 308 | 27.3 | 507 | 19.7 |
| Colic | – | – | 21 | 2.3 | 29 | 2.6 | 50 | 1.9 |
| Diarrhea | 24 | 4.4 | 17 | 1.9 | 35 | 3.1 | 76 | 3.0 |
| Dyspnea | 8 | 1.5 | 29 | 3.2 | 19 | 1.7 | 56 | 2.2 |
| Abdominal pain | 25 | 4.6 | 53 | 5.9 | 69 | 6.1 | 147 | 5.7 |
| Sore throat | 28 | 5.2 | 26 | 2.9 | 31 | 2.7 | 85 | 3.3 |
| Chest pain | 8 | 1.5 | 9 | 1.0 | 17 | 1.5 | 34 | 1.3 |
| Fever | 38 | 7.0 | 12 | 1.3 | 34 | 3.0 | 84 | 3.3 |
| Hypertension | 5 | 0.9 | 39 | 4.3 | 42 | 3.7 | 86 | 3.3 |
| Malaise | 36 | 6.7 | 87 | 9.7 | 75 | 6.6 | 198 | 7.7 |
| Muscle pain | 18 | 3.3 | 8 | 0.9 | 29 | 2.6 | 55 | 2.1 |
| Nausea | 14 | 2.6 | 54 | 6.0 | 105 | 9.3 | 173 | 6.7 |
| Dizziness | 4 | 0.7 | 23 | 2.6 | 29 | 2.6 | 56 | 2.2 |
| Cough | 21 | 3.9 | 8 | 0.9 | 17 | 1.5 | 46 | 1.8 |
| Vomiting | 34 | 6.3 | 26 | 2.9 | 59 | 5.2 | 119 | 4.6 |
| Type of health care | | | | | | | | |
| Clinical | 217 | 40.2 | 703 | 78.0 | 865 | 76.4 | 1,758 | 68.4 |
| Trauma | 323 | 59.8 | 198 | 22.0 | 264 | 23.6 | 785 | 31.6 |
| Type of trauma accident | | | | | | | | |
| | N = 323 | | N = 198 | | N = 264 | | N = 785 | |
| Fall | 81 | 25.1 | 40 | 20.2 | 38 | 14.4 | 159 | 19.6 |
| Aggression | 50 | 15.5 | 29 | 14.6 | 7 | 2.6 | 86 | 10.6 |
| Burns | 38 | 11.8 | 6 | 3.0 | 21 | 8.0 | 65 | 8.0 |
| Transport accident | 75 | 23.2 | 6 | 3.0 | 4 | 1.5 | 85 | 10.5 |
| Others | 79 | 24.4 | 117 | 59.1 | 194 | 73.5 | 390 | 51.3 |

a) FIFA: Fédération Internationale de Football Association

b) Others: Norway, Chile, Canada, Costa Rica, Italy, Switzerland, Argentina, Ghana, Peru, Belgium, Spain, Portugal, Finland, Guatemala, Suriname, Thailand, South Korea, Ivory Coast, Greece, Japan, Austria, Bolivia, Cape green, Curacao, El Salvador, Scotland, Ireland, Israel, Latvia, New Zealand, United Kingdom, Sweden, Tunisia.

evolution for the patients was: 96.5% discharges and 3.6% referrals, no death was registered, presenting a resolvability of 96.0% (Table 1).

The date with the highest number of health assistances at the FFF was 28 June, during the broadcast of Brazil x Chile, which took place in Belo Horizonte-MG. After the match, famous music bands performed on stage, resulting in an estimate public of 75,979 people and 89 health assistances only that day (Table 2).

When stratifying the data involving only urgency and emergency health care units, 540 health cares were registered, of which, 73.2% were men, and 33.3% aged from 20 to 29. Among the type of health care, 59.8% were due to traumas (accident/violence) and 40.2% were clinical. With regard to type of accident, of the 323 traumas, 25.1% were due to falls, 23.2% were due to transport accidents, 15.5% were due to aggression and 11.8% were due to burns, and the

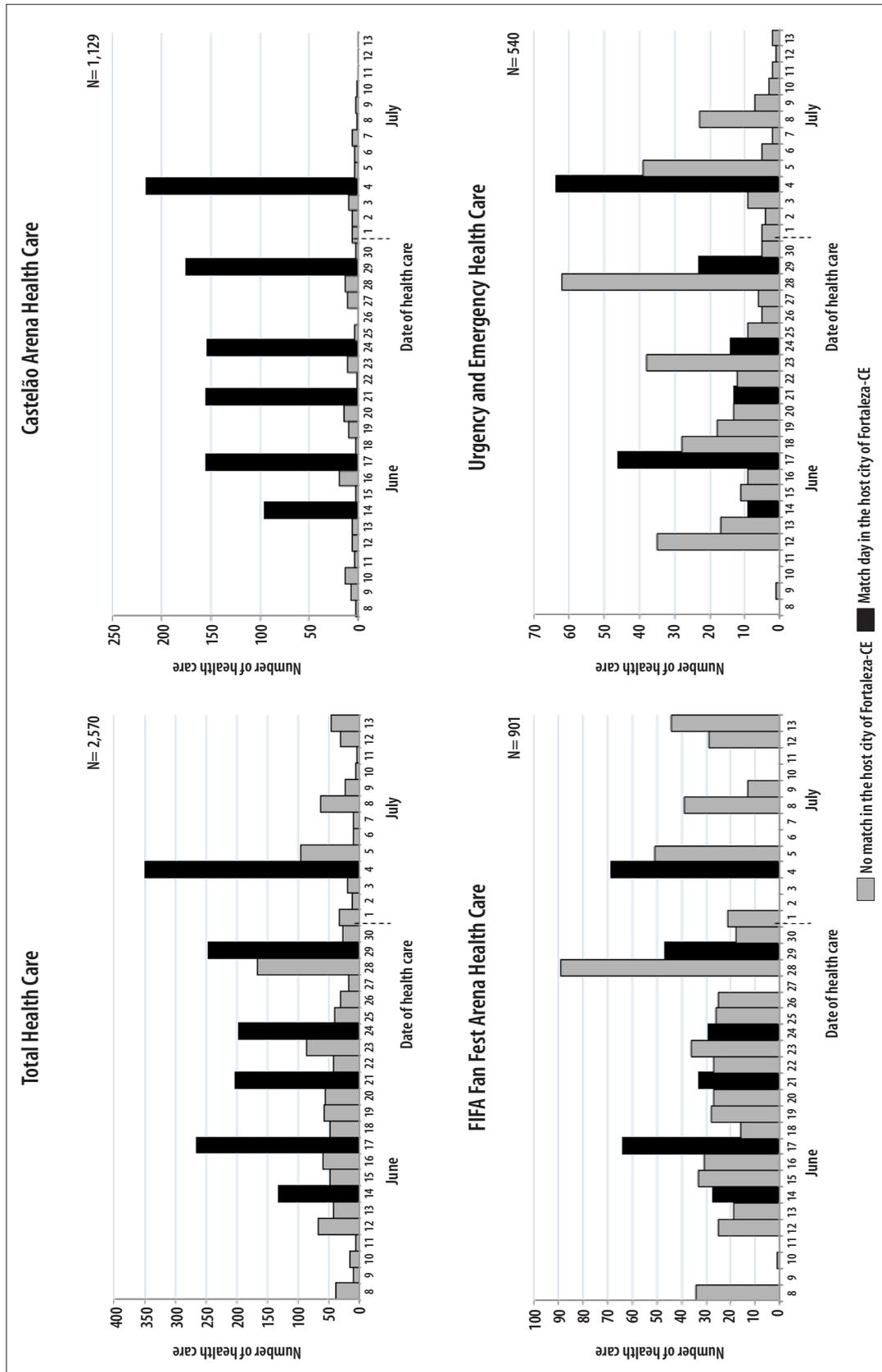


Figure 1 – Number of health care provided during the 20th FIFA World Cup 2014 in the host city of Fortaleza-CE, June-July 2014

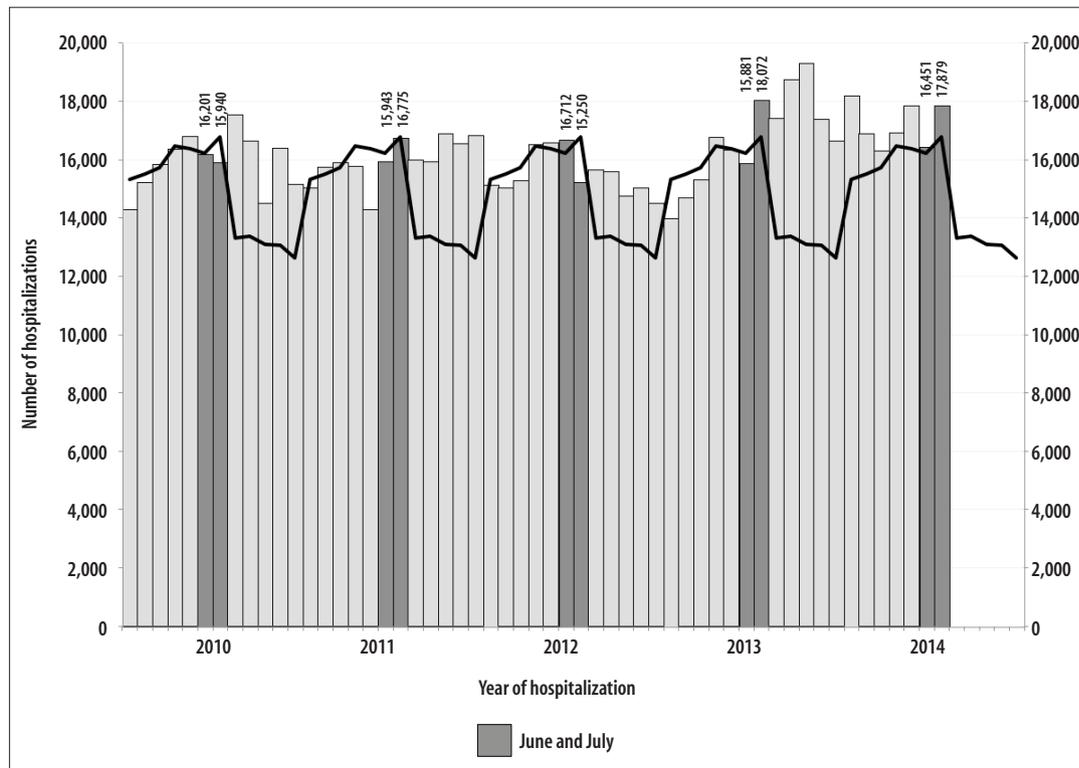


Figure 2 – Monthly number of hospitalizations, highlighting June and July, in the municipality of Fortaleza-CE, 2010-2014

other 24.4% were due to other accidents/violence (Table 1).

Concerning the patients, 92.2% were fans/spectators, 2.6% were workers and 5.2%, others. Brazilians accounted for 76.9% of the cases, 5.9% were Mexicans, 3.0% were Germans and 2.4% were North Americans (USA). With regard to risk classification, 21.7% were green, 45.7% were yellow, 7.0% were red, 0.4% was black, 15.7% were not classified and 9.4% did not present this information (Table 1).

Concerning evolution, 81.9% of the patients were discharged and 5.2% were referred, with a resolvability of 82.0%; 11.9% were hospitalized and 1.1% evolved to death (Table 1).

The strategy of syndromic surveillance only began in the second stage of the Cup, on 28 June, resulting in an opportunity loss of early detection of possible outbreaks of diarrhea, respiratory and exanthematous syndromes. No event of great relevance for Public Health was detected. However, 49 individuals assisted matched the definition of diarrhea syndrome; 44.9% of them presented diarrhea+vomiting. Concerning respiratory syndrome, 40 assistances matched the

definition, being 42.5% with fever+cough+sore throat and 42.5% with fever+cough (Table 3). No patient matched the exanthematous syndrome definition. It was not possible to identify the laboratory results for these cases, despite the integrated work with the Central Laboratory of Public Health of Ceará – *Lacen/CE*.

Discussion

The active search strategy enabled the monitoring of the participants' health situation. The *CIOCS/CE* had daily shifts and data collection with mobile devices, and this provided fast and timely data collection, information production and continuous monitoring, besides the quick decision making for health situations.

The strategy seemed compatible to its proposal. It was possible to monitor cases through syndromic approach, identify clinical and trauma assistance quickly and enable the immediate or fast access to data. No important event for Public Health was identified, in spite of the characteristics of a mass gathering event involving people from all over the world.

The characteristic of the health care performed show that male Brazilian were the majority of patients, mainly because they belonged to the most part of the target-audience of this kind of event, which is different of the pattern observed in religious events, for example.¹² The number of health care increased on game days in Fortaleza; mostly clinical assistances, of low risk and immediate discharge, with no greater complication. This pattern is similar to what is described in international literature,¹³ which shows that between 1.0 and 2.0% of the total participants need some kind of health assistance, and, among those, from 99.5 to 99.8% are health services available *in loco* and 0.2 to 0.5% need referrals to other health units of higher complexity. The same results were observed in Fortaleza.^{6,9,13,14,15}

The profile of the health care was similar to other studies on sports mass gathering events,^{13,14,16} i.e., mainly clinical and not characterized as outbreaks. The main symptoms registered were headache, nausea, vomiting and dizziness, most of times, presented isolated, possibly due to long sun exposition, dehydration, long walks and, mainly, heavy drinking, different from the symptoms presented by the participants assisted during the 2006 World Cup in Germany.⁵

The assistance to patients with alcohol use symptoms were added to the general assistances, not being possible to present them separately due to the lack of a variable that allowed this division. However, the existence of drunk patients calls attention. Brazil has a law that prohibits the entrance and sale of alcoholic beverages in locals of sports events;¹⁷ however this law is regulated by each state, and, specifically during the Brazilian World Cup, it was not applied due to a commercial agreement between the state authorities and the event organizers. This decision favored the increase of health assistances due to heavy drinking.

The low number of foreigners assisted can be explained due to their proportionally smaller presence, comparing to the national participants and due to the possible search for private services of their health insurances. For this reason, it is important to broaden the monitoring of this kind of occurrence in the other hospitals, from the days of the events until the return of the participants to their residences.¹⁸

Despite of the late start of the syndromic surveillance in Fortaleza, it was still possible to collect some cases without featuring outbreak, though. For these cases,

Table 2 – Health care and resolutivity in the health care facilities that assisted the participants of Castelão and FIFA Fan Fest Arenas during the 20th FIFA World Cup Brazil 2014 in the host city of Fortaleza-CE, June-July 2014

| Match day | Health care with referrals | | Health care without referrals | | Resolutivity (%) (%) | Total of health care N | Events' audience N | Health care rate (per 1,000 participants) |
|--------------------------------|----------------------------|-----------|-------------------------------|------------|-------------------------|---------------------------|-----------------------|--|
| | N | N | N | N | | | | |
| Castelão Arena | Trauma Clinical | | Trauma Clinical | | | | | |
| 6/14/2014:Uruguay x Costa Rica | 1 | 4 | 17 | 74 | 94.8 | 96 | 58,679 | 1.6 |
| 6/17/2014:Brazil x Mexico | 0 | 2 | 36 | 117 | 98.7 | 155 | 60,342 | 2.6 |
| 6/21/2014: Germany x Ghana | 0 | 0 | 37 | 119 | 100.0 | 156 | 59,621 | 2.6 |
| 6/24/2014:Greece x Ivory Coast | 3 | 3 | 41 | 107 | 96.1 | 154 | 59,095 | 2.6 |
| 6/29/2014:Netherlands x Mexico | 3 | 1 | 34 | 138 | 97.7 | 176 | 58,817 | 3.0 |
| 7/4/2014:Brazil x Colombia | 2 | 2 | 47 | 166 | 98.2 | 217 | 60,342 | 3.6 |
| Total | 9 | 12 | 212 | 721 | 97.8 | 954 | 356,896 | 2.7 |
| FIFA FanFest Arena | Trauma Clinical | | Trauma Clinical | | | | | |
| 6/14/2014:Uruguay x Costa Rica | 1 | 0 | 4 | 22 | 96.3 | 27 | 18,890 | 1.4 |
| 6/17/2014:Brazil x Mexico | 3 | 0 | 20 | 41 | 95.3 | 64 | 44,000 | 1.5 |
| 6/21/2014: Germany x Ghana | 0 | 1 | 5 | 27 | 97.0 | 33 | 38,026 | 0.9 |
| 6/24/2014:Greece x Ivory Coast | 0 | 3 | 7 | 19 | 89.7 | 29 | 18,421 | 1.6 |
| 6/29/2014:Netherlands x Mexico | 2 | 1 | 14 | 30 | 93.6 | 47 | 34,225 | 1.4 |
| 7/4/2014:Brazil x Colombia | 0 | 1 | 9 | 59 | 98.6 | 69 | 68,167 | 1.0 |
| Total | 6 | 6 | 59 | 198 | 95.5 | 269 | 221,729 | 1.2 |

a) FIFA: Fédération Internationale de Football Association

Table 3 – Cases according to syndromic approach assisted during the 20th FIFA World Cup Brazil 2014 in the host-city of Fortaleza-CE, June-July 2014

| Syndrome | Symptoms | n | % |
|---------------|--------------------------------------|----|------|
| Diarrhea | Diarrhea + vomiting | 22 | 44.9 |
| | Diarrhea + nausea | 14 | 28.6 |
| | Diarrhea + nausea + vomiting | 7 | 14.3 |
| | Diarrhea + fever | 6 | 12.2 |
| Respiratory | Fever + sore throat | 17 | 42.5 |
| | Fever + cough | 17 | 42.5 |
| | Fever + cough + sore throat | 6 | 15.0 |
| Exanthematous | Exanthema + fever + headache + cough | 0 | 0.0 |
| | Exanthema + fever + headache | 0 | 0.0 |

a) FIFA: Fédération Internationale de Football Association

actions of epidemiological surveillance should be conducted, with the aim of identifying possible outbreaks and perform laboratory tests; however, there was no record of results that showed if these actions were or were not be taken. Probably the surveillance network routine had conducted these actions, but if this happened, the information was not sent to *CIOCS/CE*, which can be understood as an issue to be solved for the next mass gathering events in Ceará State.

The participation of professionals from different sectors and institutions was essential to the smooth progress on the developed activities, reinforcing the need of greater interaction between all the sectors that perform activities in the Public Health sector. The strategy was well received by the volunteer data collectors: all of them showed to be interested and to have understood the activities to be executed, and their testimonials show how proud and happy they were for having participated in such innovative strategy.

The mobile devices (tablets) used for the real-time data collection proved to be useful and are able to be adopted in other mass gathering events, or other investigations that demand field data collection. However, it is necessary to make some IT improvements, in order to improve the performance of real-time monitoring. This new technology has been used in different mass gathering events in other countries.¹⁹

In Fortaleza, the comparison of data of health care conducted in the period of the 20th World Cup FIFA Brazil 2014 with data of other periods in that city revealed that the big efforts aimed at these events may be used in the improvement of the routine of the local surveillance system. The strategy of *CIOCS/CE* of establishing partnerships with other institution and

using real-time active surveillance, as well as other experience opportunities that this kind of event brings to a country,^{4,20} are part of the legacy of the World Cup for the processes of health care and surveillance of Public Health in Fortaleza and in Brazil.

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Authors' Contributions

Garcia MHO contributed to the conception, design and critical review of the study.

Paula Júnior FJ contributed to the study design, data analysis and manuscript writing.

Barbosa JR contributed to the data interpretation and manuscript writing.

Sousa GS contributed to the data collection and critical review of the study.

Silva AJM e Beltrão LAA contributed to the conception and critical review of the study.

All the authors have approved the final version of the manuscript and are responsible for all the work aspects, ensuring its accuracy and integrity.

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