The Effect of Hurricane Ivan on Emergency Department Operations at the University Hospital of the West Indies

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ABSTRACT

The objective of this study was to determine the impact of Hurricane Ivan on the operations of the Emergency Department (ED) at the University Hospital of the West Indies (UHWI). Hurricane Ivan, – a category four Hurricane – traversed the south coast of the island of Jamaica on September 10, 2004, causing damage to several parishes. The study design is a descriptive retrospective record-based incidence study of all admissions to the ED commencing at 8:00 am September 10, 2004 and ending at 12 midnight September 11, 2004, covering the period of the entire duration of the hurricane as well as immediately after. Injuries that took place during the hurricane, inclusive of gun-shot wounds (GSWs) represented 40% of the total patients seen. The types of admission are listed categorically as well as specific items to be considered in planning for potential disasters of higher magnitude. Overall, the coping mechanism of the ED at UHWI was adequate for this magnitude of disaster.

El Efecto del Huracán Iván en las Operaciones del Departamento de Emergencia en el Hospital Universitario de West Indies

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RESUMEN

El objetivo de este estudio fue determinar el impacto del huracán Iván en las operaciones del Departamento de Emergencia (DE) en el Hospital Universitario de West Indies (HUWI). El huracán Iván – un huracán de categoría 4 – atravesó la costa sur de la isla de Jamaica el 10 de septiembre de 2004, causando daños en varias provincias. El diseño del estudio consiste en un estudio descriptivo y retrospectivo de incidencias, basado en los registros de todos los ingresos al DE, a partir de las 8:00 del 10 de septiembre de 2004, hasta las 12 de la noche del 11 de septiembre de 2004. Es decir, el estudio abarca todo el período de duración del huracán y el tiempo inmediatamente después. Las lesiones ocurridas durante el período del huracán – incluidas las heridas de bala – representaron el 40% del total de los pacientes atendidos. Se hace un listado de los tipos de ingresos por categoría así como de los artículos específicos a ser tomados en cuenta a la hora de hacer planes en relación con desastres potenciales de mayor magnitud. En general, los mecanismos operativos del DE del HUWI fueron adecuados para enfrentar un desastre de esta magnitud.

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INTRODUCTION

Emergency medical services (EMS) personnel and hospitals have long been viewed as the community-based resources responsible for the critical response to a disaster involving injuries or illness (1). Immediate disaster preparation plans cannot always be implemented, particularly during sudden events such as earthquakes or fires which involve the hospital directly. A preparatory or warning phase, however, may be possible in many instances, such as hurricanes. During this time, inventories should be established and needs should be anticipated.

Hurricane disasters may cause large spontaneous or organized population movements, often to areas where health services cannot cope with the new situation, thus leading to an increase in morbidity and mortality. Displacing large populations may also increase the risks of outbreaks of communicable diseases both in the displaced and the host community, where large populations of displaced persons may be crowded together and share unsanitary conditions or

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contaminated water. The Office of Disaster Preparedness and Emergency Management (ODPEM) reported that some 7000 persons were evacuated and placed in designated shelters prior to the direct impact of the hurricane (2).

In the 20th century, Jamaica was severely affected by hurricanes in 1902, 1903, 1944, 1951 and 1988. The latter was one of our most devastating. Since then a lot of work has been done to prepare for disasters.

Severe hurricanes are responsible for many of the world's greatest natural disasters. In the United States of America (USA), hurricane damage continues to increase, primarily because of exposure of property from seashore development (3, 4). Loss of life, however, has decreased noticeably because of more effective storm surveillance and improved public warning programmes (3, 5). Locally, a signifiant portion of this task is done by the ODPEM in conjunction with the National Meteorological Service (NMS). A meteorological system making full use of modern technological aid is a prerequisite for the accurate forecasting of cyclone movement and development, and to issue accurate warnings.

On September 10, 2004, Hurricane Ivan travelled along the southern coastline of the island of Jamaica disrupting normal activities, causing damage to several communities and injury to persons. The Emergency Medicine Division (EMD) of the University Hospital of the West Indies (UHWI) (a Type I hospital) in Kingston, Jamaica, is staffed with five full-time consultant emergency physicians as well as postgraduate residents in the Emergency Medicine Programme. They are complemented with other non-programme residents as well as emergency-trained nurses and non-specialist nurses. The department sees an average of 50 000 patients per year.

The objective of this study was to determine the impact of Hurricane Ivan on the operations of the Emergency Department (ED) at UHWI. A retrospective review of emergency department logs during and immediately after was conducted to identify patients profile, diagnoses and disposition. The coping mechanism was looked at in the ED in terms of adequacy of arrangements for staffing and of equipment and supplies.

MATERIALS AND METHODS

The study design was a retrospective record-based incidence descriptive study within a designated period based on ongoing meteorological reports of Hurricane Ivan. The interval analyzed was between 8:00 am, September 10, 2004, to midnight September 11, 2004, covering the period of the hurricane and 24 hours immediately after. The strongest part of the hurricane in the Kingston area was felt during the night of September 10 to 11, so the study period included preparation time during the daytime hours of September 10. All patients who registered in the ED unit within that period were enrolled in the study.

The diagnosis was established by the attending physician and categorized based on the overall assessment of the patient, with one particular category assigned to hurricane related injuries. This was defined as one that occurred during the study interval as a direct or indirect result of the preparation for impact of the hurricane. Civilian injuries from looting were also assigned to this category (Table 1).

Table: Accident and Emergency (UHWI) admissions during and immediately after Hurricane Ivan

Gender				
Males	=	36 (54%)		
Females	=	31 (46%)		
Disposition				
Admitted to hospital	=	19 (28%)		
Discharged	=	48 (72%)		
Diagnosis			**Age X (yrs)**	**Gender M:F**
Hurricane related injuries	=	27 (40%)	24	
GSWs	=	9	26	7:2
Fractures	=	6	20	5:1
Lacerations	=	10	24	8:2
Dislocated shoulders	=	2	30	-2
Psychiatric	=	2 (3%)	48	2:0
Medical	=	22 (33%)	42	10:12
Surgical	=	11 (16%)	35	4:7
Obstetric	=	5 (7%)	27	-5
Total			**67 (100%)**	

GSW = Gun-shot wound, X = average age

RESULTS

There was a dramatic decrease in the number of patients seen on the day of the hurricane. During the period of study (40 hours), 67 patients were seen. The ED sees on an average 137 patients per 24 hours in a non-alert period. Of the 67 patients seen, 27 (40%) presented with injuries that took place during the hurricane. Eight of these patients had gunshot wounds (GSWs) to the limbs and one sustained a GSW to the abdomen requiring immediate surgical intervention. Twenty-two patients (33%) had medical diagnoses consisting chiefly of chest pains and respiratory symptoms. Eleven patients (16%) had surgical conditions mostly confined to the abdomen.

There were five obstetric cases, including a patient at term with ruptured membranes. Of note, there was no patient who was involved in a motor vehicle accident and there was no mortality reported.

DISCUSSION

In cases of natural disaster with some amount of forecasting, emergency physicians and emergency departments are dependent on peripheral services such as the ODPEM and NMS. Together with all other forms of media support, informing the general public had a significant impact on

selective patient presentation to the ED. This was reflected not only in terms of the quantity but also presentations that were highly appropriate to the restricted medical personnel and resources in the ED during this time, thereby increasing the efficiency of services overall and preventing overcrowding, or inappropriate presentations. As it turned out, a significant drop in number of patients overall was seen compared on an average 40-hour of 228 patients in a non-alert period.

Many of the patients (28%) were quite ill and required admission to the specialist wards. The authors recommend that this extent of communication by the media, ODPEM and NMS should be consistent in the future so that patients' presentations to the ED are more selective. Disaster medicine shares a common ideal with public health in triage "the greatest good for the greatest number". This does not translate into "health for all".

Presentations for trauma injuries (unintentional and intentional) represented 40% of the total patients seen during the study period. Nine of these were GSWs primarily as a result of looting and robbery attempts. Previous studies done at this institution revealed that trauma accounted for approximately 20% of admissions and that interpersonal violence accounted for approximately 40% of these cases (6). The high number of GSW-related injuries in a natural disaster is alarming and it places a heavy burden on the limited budget of the health sector. Firearm control measures should be intensified nationally.

Some of the hurricane related injuries were sustained during preparation activities and most of these patients (74%) were young males. These included strains, sprains, chainsaw injuries and hand injuries. Clearly, it is suggested that persons need to be more careful in these activities. It must be emphasized that the utilization of public information should increase the awareness to the possibility of injury and an appeal to the public to avoid injuries in all stages of the disaster. Needs in the ED should be anticipated with extra splinting materials, antibiotics, anti-tetanus therapy, disposables, suture sets and extra linen. This was justified in our setting.

Most hospitals have a disaster plan for mobilizing staff to handle unusual demands on their facilities. The UHWI Disaster Committee consist of the following personnel (7): the Chief Executive Offier (CEO) of the hospital, as Chairman, who is responsible for making all major policy decisions concerning implementation of the disaster programme on the basis of available information and in consultation with other personnel, the Director of Clinical Services, who is responsible for coordinating with heads of clinical departments the disaster medical care of in-patients and the Deputy Chairman who serves as his alternate. In the absence of both, the Senior Surgical Resident on duty will act. The Director of Nursing services is responsible for organizing and supervising disaster nursing services. There is now a National Disaster plan and a National Disaster Health plan. Disasters are managed by the National Disaster Committee which is chaired by the Prime Minister. It is comprised of all govern-ment ministers concerned with all aspect of disaster man-agement as well as the director of the ODPEM and other institutions. The impact of Hurricane Ivan on activating the chain of commands was well demonstrated at the institution at all levels. This was ensured by early debriefing prior to the impact of the hurricane and continuous communication and interactions throughout this period. Those who were on duty included not only medical personnel, but electricians, generator operators, carpenters and plumbers who ensured maximum function under the circumstances. Some suggestions arising from the experience with Hurricane Ivan that a hospital ED may wish to implement in planning for a major hurricane or other natural disaster are:

1. The arrangement for ED staff to be on site before the hurricane strikes so that sufficient staff is available if the transportation system should break down.
2. Be prepared to compensate for the loss of running water, especially so, where wounds and lacerations from injuries are likely. The availability of huge standby water tanks proved very essential, adequate and helpful.
3. Have a plan to compensate for loss of electricity to run nebulizers, autoclaves and radiology equipment. Standby generators should be routinely checked and be prepared.
4. Ensure inventory checks ahead of time with additional medical supplies that may be needed, including splinting materials, intravenous antibiotics and tetanus immunizations. This was quite adequate in this setting.
5. Have secretarial staff and patients' advocate in screening telephone calls with the direct input of a doctor and to allocate resources most appropriately. Again this was adequately done in this case.

A Hospital Emergency Committee is paramount and the availability of public information is essential. Overall the coping mechanism of the ED at UHWI was adequate for this level of disaster.

Although Hurricane Ivan was a category 4 hurricane, the island did not suffer a direct impact and its overall effective magnitude was diminished. As a result, its impact is not considered ideal in terms of assessing ED response but certainly the experience can be utilized as a model to prepare for a greater magnitude disaster. Emergency department awareness of this type can facilitate medical and public health decision-making during natural disasters and have an impact on policies for future potential disasters. Major limitations of the study were the short period over which the survey was done and the inclusion of only patients who attended the hospital during the study interval.

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