

Foreign field hospitals after the 2010 Haiti earthquake: how good were we?

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ABSTRACT

Objective To assess the timing and activities of foreign field hospitals (FFH) deployed during the first month after the Haiti earthquake and to evaluate adherence to WHO/Pan American Health Organization (PAHO) guidelines. Results were compared with data from past sudden-onset disasters.

Methods A systematic attempt was made to contact all relief actors within the health care sector involved in the 12 January through 12 February 2010 FFH deployment. This was done using an email-based questionnaire and a web survey. In addition, the authors undertook a literature review using PubMed and the Google search engine between March 2010 and May 2011. The authors contacted key informants and agencies identified by direct observations in the field by email or phone.

Results A total of 44 FFH were identified. The first FFH was operational on day two post-earthquake. The number of FFH beds peaked at about 3300 on day 17 post-earthquake. During the first month, the authors estimate that FFH conducted no more than 12 000 major surgical operations. While 25% of the FFH adhered to either WHO/PAHO first essential deployment requirements, none followed both requirements of WHO/PAHO. Compared with the 2005 earthquake in Pakistan, twice as many FFH provided medical care, resulting in three times more FFH beds.

Conclusions The present study suggests that more FFH were sent to Haiti than to any previous sudden-onset disasters, but due to lack of data and transparency it remains impossible to determine to what extent did the first wave of FFH do any good in Haiti.

INTRODUCTION

On 12 January 2010, the Haitian capital, Port-au-Prince was struck by an earthquake of magnitude 7.0 with 'an unimaginable impact'.¹ The Centre for Research on the Epidemiology of Disasters reported 222 570 deaths² and over 300 000 people were reported injured.³

Haiti, a low income country, has always struggled to provide adequate healthcare for its population. Before the earthquake, only 40% of the population had access to basic healthcare⁴ and <60% of the children were vaccinated against measles.⁵ In 2009, the country had only 13 hospital beds per 10 000 people.⁵ Prior to the earthquake, an estimated 10 000 non-governmental organisations were present in Haiti; many of them were providing healthcare.⁶

More than half of Haiti's hospitals were located in the earthquake affected area. Over 60% of Haiti's secondary and tertiary hospitals sustained severe damage or were completely destroyed, while only 10% of primary health centres were destroyed.³

The local Haitian medical staff responded immediately to the disaster with commendable courage, as did international medical agencies already in the country. However, it soon became apparent that the medical needs were overwhelming, particularly for secondary and tertiary care.

The international community responded promptly.⁷ Many international agencies provided full medical services with logistic support and backup, while other medical staff came alone or in clinical groups.⁷⁻¹⁰ Foreign Field Hospitals (FFH)¹ were deployed but without coordination. The post-earthquake situation in Haiti was unique with regard to the large number of injured requiring specialised surgical trauma care.¹¹ In the past, FFH deployed to sudden-onset disasters (SOD) have been found to arrive too late to provide life-saving trauma care. They have also been criticised for over-focusing on trauma care and for being ill-adapted to dominating health needs of the affected region.¹²⁻¹³ Similar observations were made after the Haiti earthquake.¹⁴⁻¹⁵

Several reports published since the earthquake describe experiences from individual FFH.¹⁶⁻²¹ However, no publication has systematically reviewed the overall FFH response. The primary objective of this study was to assess the timing and activities of FFH deployed during the first month after the Haiti earthquake. The secondary objective was to evaluate adherence to WHO/Pan American Health Organization (PAHO) guidelines. Results were also compared with data collected from past SODs.

METHODS

Data pertaining to the FFH response to the 12 January 2010 earthquake in Haiti were collected and analysed using a similar approach as described in the only previous study compiling FFH response data.¹⁵ The WHO definition of a field hospital, 'a mobile, self-contained, self-sufficient healthcare facility capable of rapid deployment and expansion or contraction to meet immediate emergency requirements for a specified period of time' was expanded in our study to include any foreign medical team performing emergency surgery in already existing structures. In our study, we included FFH established in Haiti between 12 January 2010 and 12 February 2010, but not surgical activities performed in domestic hospitals by national staff. This study is based on an opportunistic data-collection approach.

Primary data collection

A systematic attempt was made to contact all relief actors within the healthcare sector who were involved in the 12 January through 12 February

2010 FFH deployment. For this purpose, an email questionnaire including questions on period of deployment, location, type of field hospital, number of beds, number of major and minor surgeries, number of patients operated and cost of deployment was developed in collaboration with WHO/PAHO and sent to all 274 agencies listed by WHO.²² The agencies' own definitions of major and minor surgery were used. The questionnaires were sent in March 2010 with a response deadline of 11 April 2010.

A web survey based on the email questionnaire was performed using the Textalk Websurvey Service. Survey invitations were sent to 14 agencies identified as having sent a FFH to Haiti after the earthquake. The web survey opened on 8 June 2010 and closed on 21 April 2011.

Secondary data review

In addition to the questionnaire, we searched the internet between March 2010 and May 2011 for information on the pre- and post-earthquake health situation in Haiti, the number of FFH deployed, the date of arrival and departure, affinity to agency and country of origin, number of beds, major and minor surgeries and cost from 12 January and 1 month forward. Google search engine was used with the key words 'FIELD HOSPITAL', 'HAITI, (COUNTRY) (eg, Cuba, Italy, etc), (NATIONALITY) (eg, Cuban, Italian) (AGENCY) (eg, MSF, Medishare, etc) alone or in combination. PubMed was searched with the key words EARTHQUAKE HAITI. Authors of relevant publications were contacted by email, when necessary, to obtain more exhaustive data. Additional information was also retrieved from websites aimed at providing information to humanitarian actors including the OneResponse website for Haiti and ReliefWeb. For comparison purposes, we retrieved data on FFH activities in past SODs in Iran, Indonesia and Pakistan.¹³

Key informants

Key officials in the WHO and UN were contacted for information and data regarding FFH. All FFH agencies not identified by WHO/PAHO registers and internet searches were contacted by email or phone.

Direct observations

Two of the authors are surgeons (AW, JvS) with experience from international humanitarian relief. They were working for two different sections of Médecins sans Frontières (MSF) in Haiti in the immediate aftermath of the earthquake and collected information on different providers of FFH whom they encountered. These agencies were later contacted for more information.

Analysis

For analysis, all retrieved data were reviewed and compiled into a single database. The total number of major surgical operations performed during the first month after the earthquake was calculated. Due to lack of detailed data, we used the following assumptions and logic: detailed MSF surgical activities data for the first 3 months indicate that 40–45% of their major operations were performed during the first month. The same percentage was used for the Cuban FFH since their data also refer to the first 3 months. For FFH with data on major operations beyond the study period but <3 months, a major operations/day value was calculated. For the remaining FFH, the data on major operations was used as provided.

The period of deployment was compared with WHO/PAHO guidelines for the use of FFHs in the aftermath of SODs.²³ These are the only available standards for FFH deployment. They are

currently under revision, based on recent SOD experience. Identified FFH activities were evaluated against the first essential deployment requirements of these guidelines for:

1. *Early emergency medical care* (48 h): to provide life-saving medical care for trauma cases, requiring FFH to be in the country within 24 h of the event.
2. *Follow-up trauma and medical care* (days 3–15): to provide hospital care that meets the immediate needs of the affected population, requiring FFH to be operational 3–5 days following the disaster.

Data from agencies whose presence was validated by at least two different sources were used in this study.

RESULTS

A total of 1.5% of the agencies (4/274) responded to the questionnaire while 14% (2/14) responded to the web survey. The top 100 hits for each Google search string were screened for relevance. In all, 413 potentially relevant hits were examined in full. In addition, the PubMed search performed in February 2011 returned 215 hits. We examined all titles and abstracts, and obtained relevant articles in full text, retrieving information from 100 articles. A total of 20 documents were gathered from ReliefWeb, while eight were collected from OneResponse. The most detailed data were obtained through personal emails and phone contact.

Through this collection of data, we were able to verify the presence of 44 FFH (table 1) in Haiti during the first month following the earthquake. We retrieved data on the duration of deployment in 59% of FFH, number of beds in 61%, number of operations in 84%, number of patients operated in 18% and estimated cost of deployment in 9%.

Based on retrieved official data, we estimate that about 11 700 beds were available in Haiti before the earthquake. Reportedly, 61% of the hospitals were destroyed, leaving about 4800 remaining beds immediately after the earthquake. The first FFH became operational 2 days after the earthquake. Within 7 days, FFH provided 1600 beds and FFH beds peaked at about 3300 on day 17 (figure 1). Then, the number of FFH beds levelled off and remained at this level for the remainder of the first month.

Total number of operations

The FFH for which we received detailed data, reportedly performed at least 8700 major surgeries during the first month. We lack data on the number of major surgeries performed from 22% (10) of the FFH. To our knowledge, these latter FFH were relatively small. Assuming that these latter FFH performed as many surgeries as other FFH, we calculate the total number of major surgeries during the first month following the earthquake to be >11 500 but <12 000.

Adherence to WHO guidelines and comparison with earlier SODs

No FFH arrived or was operational within 24 h. Ten (22%) FFH were operational within 5 days. These findings are similar to those of previously studied SODs in that no FFH arrived within 24 h for any of the previously studied SODs (table 2).

DISCUSSION

Study overview

This study's results show no improvement in data sharing and availability since the last major compilation of FFH activities after SODs in 2008.¹³ It is discouraging to note the extremely low reply rate to the questionnaire. This shows that current

FFH intervention is a black box, there is no control or coordination of the intervention. The fact that it was impossible to determine the outcome of FFH activities in Haiti raises serious accountability questions. Given the limited data that we were able to retrieve, this overview is not complete. It does not capture all foreign medical teams that arrived in Haiti during the

first month following the earthquake. In addition, most of the data collected are from non-peer-reviewed sources (internet and personal communication). Despite these limitations, this study is, to the best of our knowledge, the most comprehensive compilation of FFH present in Haiti following the 2010 earthquake available at this time.

Table 1 Main characteristics of identified foreign field hospitals

FFH provider	Operational on day (days on site)	No of beds	No of major operations/ minor operations	No of patients operated
B-FAST, Belgium	2 (>Feb 12)	15	200/2000*	300*
Brazilian air force	4 (>Feb 12)	25	1082/—†	—
China	—	—	—	—
Canadian army	17 (>Feb 12)	103	192/—*	—
CMAT‡, Canada	4 (>Feb 12)	0§	—	—
Colombian army	—	20	—	—
CRUDEM Foundation, USA				
Hôpital Sacré Coeur	11 (8)	>400	200/80*	280*
Cuba¶				
Arcahaie	26 (—)	—	3562/4337**	—
Croix des Buquet,	14 (—)	—	—	—
Carrefour	—	—	—	—
Léogâne	7 (—)	—	—	—
Jacmel	10 (—)	—	—	—
DIHM††, Switzerland				
L'Hôpital de l'Université d'Etat d'Haiti	5 (>Feb 12)	—	738* ‡‡	258* ‡‡
Disaster Recovery Center§§	13 (—)	400	—	—
France				
FFH	4 (>Feb 12)	60–70	364/—¶¶	—
Sirocco, French Navy	—	—	—	—
Advanced medical unit	—	—	—	—
GHESKIO***	—	—	139/—†††	—
International Surgical Health Initiative				
Eliazar Germain Hospital	12 (8)	45	82/—*	—
Israeli Defense Force	4 (13)	60‡‡‡	244/—*	203*
Jordan	3 (>Feb 12)	50	—	1254†††
Medécins sans Frontières				
OCA				
Carrefour	19 (>Feb 12)	100	605/—†††	—
OCB				
Choscal	2 (>Feb 12)	100	748/—†††	—
Chancerelles	6 (>Feb 12)	248	—	—
OCBA				
Jacmel	17 (>Feb 12)	70	44/—†††	—
Bicentenaire	29 (>Feb 12)	76	—	—
OCP				
Trinité/St Louis	10 (>Feb 12)	200	617/—†††	—
OCG				
Léogane	10 (>Feb 12)	90	318/—†††	—
Lycée	22 (>Feb 12)	85	—	—
Mickey	18 (>Feb 12)	100	—	—
Merlin, UK	9 (>Feb 12)	40	192/48†††	392* ††
Partners in Health, USA				
L'Hôpital de l'Université d'Etat d'Haiti	10 (8)	—	103/14*	88*
Partners in Health, USA/Zanmi Lasante, Haiti				
Cange	—	—	232/—§§§	—
Hinche	—	—	86/—§§§	—
Saint-Marc	—	—	149/—§§§	—
Petite-Rivière	—	—	46/—§§§	—
Qatar	4 (—)	—	—	—
Red Cross				
NRC/CRC	6 (>Feb 12)	20	300/—†††	—
GRC/FRC	16 (>Feb 12)	160	99/—†††	—

Continued

Table 1 Continued

FFH provider	Operational on day (days on site)	No of beds	No of major operations/minor operations	No of patients operated
Russia	3 (15)	17	127/46*	—
Spain	—	—	—	—
Turkey	9 (>Feb 12)	20	353* ††	—
University of Miami/Project Medishare, USA	15 (—)	250	1000/—†††	500†††
USNS Comfort, USA	7 (>Feb 12)	1000	843/—*	—

*During the whole deployment.

†Until May 13.

‡Canadian Medical Assistance Team.

§CMAT had between 8 and 12 daytime beds, but no overnight capacity.

¶Cuban staff were active in 10 hospitals of which 5 where Cuban FFH.

**During the first 3 months.

††Division of International and Humanitarian Medicine.

‡‡Both major and minor operations.

§§Staffed and run by Love a Child, Harvard Humanitarian Initiative, University of Chicago Medical Center, Albert Einstein Hospital from Brazil and a disaster response team from Ecuador.

¶¶As of February 4.

***The Haitian Group for the Study of Kaposi's Sarkoma and Opportunistic Infections, staffed by the International Medical Surgical Response Team and Disaster Medical Assistance Team, USA.

†††Until February 12.

‡‡‡That could be expanded to 72.

§§§During the period 12 January to 5 February.

CMAT, Canadian Medical Assistance Team; CRC, Canadian Red Cross; DIHM, Division of International and Humanitarian Medicine; FFH, foreign field hospital; FRC, Finnish Red Cross; GHESKIO, Groupe Haïtien d'Etude du Sarcome de Kaposi et des Infections Opportunistes [The Haitian Group for the Study of Kaposi's Sarcoma and Opportunistic Infections]; GRC, German Red Cross; NRC, Norwegian Red Cross; OCA, Operational Center Amsterdam; OCBA, Operational Center Barcelona; OCB, Operational Center Brussels; OCG, Operational Center Geneva; OCP, Operational Center Paris; USNS, United States Naval Ship.

Timing

The only FFH operational within 48 h with structures deployed from abroad was B-FAST, from the Belgian civil defence. One reason may be that B-FAST integrates medical and search and rescue services. As the cost effectiveness of search and rescue is extremely limited, the approach of combining search and rescue and medical services is increasingly being discussed among search and rescue agencies.²⁴ However, the impact of this approach may be controversial as the strategy of an FFH deployed to a disaster must be to optimally balance its resources to save as many lives as possible. Arriving within the first 72 h will mean having to treat patients that would otherwise have died due to 'natural triage'. Caring for such severely traumatised patients may require diverting resources that could be more effectively used saving less severely injured patients, especially during disasters of tremendous proportion such as the one in Haiti. Additional studies are needed to gain better insight into the impact and effectiveness of a fast-deployment strategy under various scenarios.

Another finding is the relatively slow deployment of FFH. It took up to day 17 before the peak number of FFH beds was

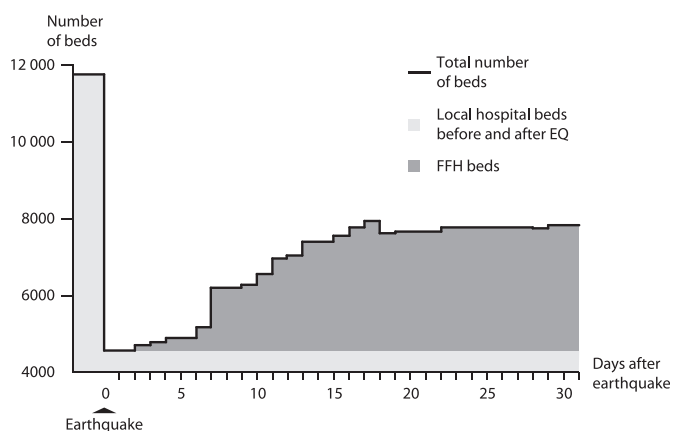


Figure 1 Number of local hospital beds before and after the 2010 Haiti earthquake compared with number of FFH beds. Data from 59% of FFHs were included. EQ, earthquake; FFH, foreign field hospitals.

reached. This probably reflects that several of the FFH were organised, assembled and sent ad hoc. If FFH are not able to arrive within 1–2 weeks, their trauma care impact is likely to be very limited.

At least five (11%) FFH stayed for a very short period of time, three only for a week. The cost effectiveness and medical value of such short intervention is debatable. It remains clear that there are other motives, besides the medical needs, that trigger sending FFH. The political benefit of sending a FFH should not be underestimated. However, better coordination is needed to better adapt the FFH response.

Activities

Agencies reported the number of operations rather than people operated upon, and many patients required several operations. Therefore the number of patients operated is significantly lower than the 12 000 major surgeries found in this study. In comparison, the number of injured has been reported as 300 000. If this figure is correct, only one in 25 injured people required major surgery. Domestic surgical capacities were severely limited requiring an additional capacity from FFH.

It is noteworthy that 10% of all major surgeries during the first month, reported by MSF, were obstetrical. This illustrates that despite huge needs for trauma care, a FFH must also cover common conditions requiring hospital care. The role of an FFH is to substitute for the collapsed hospitals. This requires a multidisciplinary setup of the FFH.

Table 2 Comparison of foreign field hospital in recent sudden-onset disasters

	Iran 2003	Indonesia 2004	Pakistan 2005	Haiti 2010
No. of FFH	11	9	22	44
Within 5 days (%)	6 (55)	0 (0)	8 (36)	10 (23)
Average time for FFH to arrive in days	5.8	14.2	9.6	10.2
Day of peak no. FFH beds (peak no. FFH beds)	7 (550)	20 (520)	21 (1100)	17 (3338)
No. FFH beds/10 000 injured	183	69	183	111

FFH, foreign field hospital

Only B-FAST shared data that allows an estimation of daily bed cost, which was approximately US\$1160. This corresponds well with previous findings by von Schreeb *et al*¹³. One may assume that the daily FFH per bed cost on Haiti is within the range of US\$1000–2500.

WHO/PAHO guidelines and comparison with earlier SODs

With respect to the FFH concept, the WHO/PAHO deployment guidelines in their current form do not capture the diversity of foreign medical relief and services available through the different types of agencies. This fact limited our analysis. More appropriate guidelines are needed that should be anchored among the agencies sending FFH. New guidelines should require agencies to share data on their activities. We welcome the initiative to start registering foreign medical teams²⁵ and hope that this process will encourage increased transparency and accountability.

In addition, this study from Haiti and studies from earlier disasters have shown that it is impossible for FFH to arrive and provide care within 24 h. Even arriving within 3–5 days is a major challenge for most agencies. The FFH response to Haiti was by far the biggest in history. About three times as many FFH beds were available in Haiti compared with those in the 2005 South Asian earthquake in Pakistan.

CONCLUSION

The Haiti earthquake was exceptionally devastating in that it affected a densely populated capital that did not enforce building codes. Undoubtedly, FFH in Haiti saved lives.¹⁵ However, it remains impossible to determine the true medical impact, outcome, cost effectiveness and quality of the surgical care provided by FFH. It is disappointing to note that this massive medical response, presumably at immense cost, is wholly inadequately documented. Despite the extremely difficult circumstances of their deployment, international medical relief agencies should be held accountable for the services they provide. Without basic outcome data, there can be neither accountability nor lessons learnt. We argue that the good intentions of charity healthcare should require data to allow analysis of humanitarian aid. Without a clear mechanism for accountability, mistakes cannot be corrected, nor procedures improved, in future disasters. Context-adapted standards should be applied to this act of solidarity as to any other medical service.

More work is needed to develop common definitions and concepts. The term, FFH, does not adequately define the type and level of services that are provided. It may be better to define international medical relief by the type of services provided rather than by the type of facility providing these services. For example, it may be advisable to use the term Foreign Medical Teams (FMT) and the level of care provided. In addition, a system to encourage and ensure data collection and sharing should be a key component of the initiative to start registering FMT providing surgical care in SODs.²⁵ Moreover, work is needed to set up training, develop quality indicators and treatment guidelines. Although we deeply appreciate and value the humanitarian aims of all those involved in emergency medical intervention in disasters, we believe it is incumbent on us as medical professionals to improve this medical response and assure that those in need receive the best possible FMT response.

The question remains: How good were we in Haiti after the earthquake? The answer is: We hope we were good, but sadly, there is not enough data to prove to what extent we did good.

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