

Brief Report

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Impact of a Disaster Drill on Waiting Times in a Pediatric Emergency Department

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Abstract

Objective: Emergency departments should improve their preparedness for mass casualty incidents (MCIs) through periodic drills. These exercises are conducted while maintaining regular care. The aim of this study was to determine the impact of a disaster drill in a pediatric emergency department (PED) on real patients' waiting times.

Methods: On September 10, 2019, a 4-h disaster drill was conducted in the PED of a tertiary pediatric hospital, with minimal staff reinforcement (2 nurses). Cases were real patients that came to the PED during the drill. The patients that visited the PED the day before were the control group. Variables analyzed were: age, sex, destination, triage level, time-to-triage, time-to-physician, length of PED stay, and percentage of patients visited within the optimal time according to triage level.

Results: Sixty-eight patients (case group) and 63 patients (control group) were analyzed; both groups were comparable except for the median age. There were no differences in time-to-triage, time-to-physician, and length of PED stay between the 2 groups. The percentage of patients visited within optimal time according to triage level was higher in the case group.

Conclusions: Conducting an MCI drill in the PED, with minimal staff reinforcement, was not detrimental to real patients' waiting times.

Mass casualty incidents (MCIs), such as natural or man-made disasters, entail a sudden surge of unexpected patients in emergency departments. These events pose a difficult test for hospitals, which must reorganize their material and human resources, and for health-care providers, who must care for the victims as efficiently as possible.

Drills are coordinated and supervised exercises with the following objectives: (1) to evaluate emergency plans, (2) to train staff on how to proceed during a disaster, and (3) to assess disaster-related knowledge and skills and identify weaknesses therein. They are a proven way of enhancing MCI preparedness in emergency departments, and teams that participate in periodic drills are more effective in their response. For these reasons, several organizations recommend conducting drills for their disaster plans periodically.^{1–8}

Despite their effectiveness, drills are complex exercises: they require thorough preparation and often involve a large number of simulated patients that must be attended to by many health-care workers from several departments. In emergency departments, drills should be conducted alongside normal activities to make them more realistic. During the exercise, proper care for the real patients should be guaranteed, which is an added challenge in these circumstances.^{2–5}

The aim of this study was to objectively measure the impact of an MCI drill on the quality of the care provided for the real patients visiting the pediatric emergency department (PED), by analyzing their waiting times.

Methods

The Drill

The exercise preparation process began with the creation of a multidisciplinary team, composed by staff from the PED and the simulation department. For 4 months, this team studied the disaster plan and decided on the key points to be tested during the drill. Then, the drill script was written and the different simulated patients were designed.

Participants were told which day the drill was going to take place, and a session about the disaster plan was conducted some days before the event.

The drill was held on Tuesday September 10, 2019, from 8 AM to 12 PM. The simulated MCI was a bus crash with 7 fictional pediatric victims (represented by actors and high-fidelity simulation manikins) of different clinical severities. Victims and their families were assessed and stabilized by the usual PED personnel (composed of 10 pediatricians, 2 surgeons, 1

Table 1. Characteristics of the case group and control group

		Case group n = 68	Control group n = 63	P
Age (years)*		7 (1-14)	4.5 (1-10)	0.048
Female (%)		47.1	50.8	NS
Triage level (%)**	2	4.5	14.8	NS
	3	16.7	18.0	
	4	39.4	44.3	
	5	39.4	23.0	
Patients sent home (%)		94.1	85.7	NS
Disease category (%)	Respiratory and Circulatory	20.6	20.6	NS
	Digestive and Genito-urinary	25.0	23.8	
	Nervous System	8.8	12.7	
	Injury	27.9	23.8	
	Cutaneous	17.6	19	

* Expressed as median (IQR)

**Triage level: 2: emergency (could become life-threatening); 3: urgent (not life-threatening); 4: semi-urgent (not life-threatening); 5: non-urgent (needs treatment when time permits)
NS: Non-significant

traumatologist, 6 nurses, 8 nursing assistants, and 2 administrative staff members), reinforced by 1 nurse and 1 nursing assistant.

While the drill was taking place, real patients were simultaneously attended to in the PED, following the indications of our disaster plan.

The disaster drill was divided into the following parts:

- From 8 AM to 9 AM: welcome session (participants were informed how the drill would be conducted).
- From 9 AM to 10 AM: activation of the disaster plan and victims' arrival to the PED.
- From 10 AM to 12 PM: debriefing session (participants were divided into 2 groups to maintain the normal activity of the PED; each group participated in a 1-h debriefing session).

The Study

All the patients who visited the PED on the day of the drill from 8 AM to 3 PM formed the case group. A control group was composed of the patients who visited the PED the day before the drill (Monday, September 9, 2019) from 8 AM to 3 PM. Patients seen in the PED up to 3 h after the drill were included to consider all possible effects of the exercise on patient flow.

The following patient variables were analyzed: age, gender, disease category (respiratory/circulatory, digestive/genitourinary, nervous system, injury, cutaneous), destination at discharge, and triage level. To assess the impact of the MCI drill on the quality of care received, time-to-triage, time-to-physician, length of stay in the PED, and percentage of patients visited within the optimal time according to their triage level were calculated for the real patients.

The study was authorized by the Research Ethics Committee of the Sant Joan de Déu Foundation (PIC-212-19).

Results

There were 68 case patients and 63 control patients. The characteristics of both groups are shown in Table 1. Both groups were comparable as regards gender, level of triage, and destination at discharge, but the case patients were younger than the control patients (median age of 7 y vs 4.5 y; $P = 0.048$).

The median time-to-triage, time-to-physician, length of stay, and the proportion of patients visited within the optimal time according to their triage level are shown in Table 2.

Discussion

According to our results, conducting an MCI drill did not negatively affect waiting times and length of PED stay for real patients, and for some the waiting times were even shorter the day of the drill. Other studies have previously found similar results.^{2,3} For example, Timm and Kennebeck analyzed 9 disaster drills carried out at a single pediatric hospital, finding that there were no differences in waiting times in the PED and that admitted patients even spent less time in the PED during disaster drills. They stated that the activation of the hospital-wide emergency management plan was responsible for this positive effect on real patients.³

In our case, the PED was the only department that reorganized itself during the drill to provide care for the simulated and real patients. Nevertheless, the positive impact could be explained by a more structured organization focused on coordinated teamwork, the specific designation of a team responsible for real patients' care, and the participants' engagement. As a result, patients were treated in a more efficient way.

Another detail to take into account is that the debriefing took place in 2 groups. Therefore, while half of the team carried out the debriefing, the other half could visit patients, so the drill only affected 100% of the team during the first hour, whereas 50% of the team could work during the remaining 2 h. In addition, the participants were aware that they were being observed while working, which could correlate with higher productivity, as described by the Hawthorne effect.

It is important to highlight that there was minimal staff reinforcement (to prevent delays in the seeing real patients), and some physicians and nurses from other departments came to help like they would have done in a real disaster. In addition to this spontaneous help, we believe that staff reinforcement should be considered when designing a drill to ensure a successful exercise, especially if a large flow of patients is foreseen.⁶

On the other hand, the impact on real patients' care should not only be measured in terms of time, but must include the families' and patients' perceptions of quality of care. Optimal care will be

Table 2. Median waiting times and proportion of patients seen within the optimal time according to their triage level

	Case group n = 68	Control group n = 63	P
Time-to-triage (minutes)*	9 (6-15)	12 (5-13)	0.07
Time-to-physician (minutes)*	35 (7-80)	31.5 (7-78)	NS
Length of stay (minutes)*	100 (85-185)	125 (65-170)	0.05
Triage level**	2	100%	NS
	3	72.7%	NS
	4	80.8%	0.024
	5	100%	NS

* Expressed as median (IQR)

**Triage level: 2: emergency (could become life-threatening); 3: urgent (not life-threatening); 4: semi-urgent (not life-threatening); 5: non-urgent (needs treatment when time permits)
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safe, effective, efficient, personalized, timely, and fair.³ These factors were not considered in our study, but Charney et al. surveyed caregivers whose children were seen during drill exercises and they were satisfied with their visit to the PED, expressing a high likelihood to recommend it to others.² For further studies, we suggest including subjective factors such as communication with health-care professionals, pain management, and hospital facility evaluations regarding things like cleanliness, quietness, etc. We did not measure these in our study, but they can play an important role in the perceived quality of care.

Limitations

In our opinion, our results may be affected by the fact that staff was aware of the drill day in advance (which allowed them to prepare better for the event). We imagine that if the drill had taken place without the participants being previously aware of it, the organization of the teams and the waiting times might have been different.

Furthermore, the drill was conducted during moderate volume times (beginning of the autumn), leading us to think that results could have been different if we had stressed the PED during high-volume times (like winter). In addition to this, the staff reinforcement, even as minimal as it was, could have led to reduced real waiting times.

Conclusions

In summary, our findings suggest that the PED can learn and benefit from disaster drills, improving MCI preparedness without

being detrimental to real patients' care times. The drill even favored more efficient medical care, probably due to better organization and a teamwork-centered approach.

Conflict(s) of interest. The authors have no conflicts of interest to declare.

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